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Hard Disk Manager™ 15 Suite

User Manual

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Introduction

Paragon Hard Disk Manager™ 15 Suite is an integrated set of powerful tools that is specially designed to tackle most of the problems you might face while using PC. Its functionality covers all aspects of a computer life cycle beginning from carrying out all the necessary partitioning operations to install the system from scratch and providing its data reliable protection to secure utilization of an outdated hard disk.

In this manual you will find the answers to many of the technical questions, which might arise while using the program.

Our company is constantly releasing new versions and updates to its software, that's why images shown in this manual may be different from what you see on your screen.

What's New in Hard Disk Manager 15

- **Advanced Encryption Standard (AES) support.** A symmetric block algorithm used by the U.S. government is available now to protect your personal data. This option is available only for VD containers.
- **System state data backup support.** A special option will help you automatically back up all critical system settings alongside with some important applications data while ignoring other data stored on the system partition. This way you can create an optimal backup image of system state to get the system and Microsoft applications quickly back on track.
- **VMWare vSphere ESX/ESXi support.** Our product supports VMWare vSphere ESX/ESXi 4.x/5.x.

Product Components

In order to cope with different tasks, the product contains several components:

- **Windows based set of utilities** is the crucial part of the product. With the help of an easy to use launcher you may find and run tasks of any complexity in the field of data and system protection, hard disk partitioning and cloning, etc.
- **Linux/DOS based recovery environment** is a multi-platform bootable media that enables to run utilities under Linux or PTS DOS, and that way to get access to your hard disk for maintenance or recovery purposes. Both platforms have their strong sides, for instance Linux can boast support of FireWire (i.e. IEEE1394) or USB devices. It enables to burn CD/DVD discs. However there can be some difficulties with detecting new hardware. DOS in its turn has no problems of that kind but is limited in features. The Linux/DOS recovery environment requires no installation and can be of great help when the system fails to boot. Besides it offers a Windows XP like environment.
- **WinPE based recovery environment**. Especially for keen followers of Windows, our product offers the option to prepare a WinPE based bootable media. Unlike the Linux/DOS recovery environment it can boast an excellent hardware support and the same interface as the Windows version can. However its system requirements are much tougher.

Features Overview

This chapter dwells upon key benefits and technical highlights of the product.

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Features

Let us list some of the features:

User Friendly Fault Minimizing Interface

- **Graphical representation of the data** to gain a better understanding.
- **A handy Launcher** to easily find and run the required tasks.
- **Comprehensive wizards** to simplify even the most complex operations.
- **A context sensitive hint system** for all functions of the program.
- **Previewing the resulting layout of hard disks before actually executing operations** (so-called virtual operations).

Backup Facilities

- **Archive Database** to help the user easily manage backup images (get properties, add, delete, mount, etc.).

This feature is only available for the Windows installation of the program.

- **Available location for backup images**:

  - *Backup to local mounted partitions*.

  - *Backup to local unmounted (without drive letter assigned) partitions*.

  - *Backup to an external mounted storage* to provide for a higher level of data protection and system independence.

  - *Backup to a special secured place on the hard disk called the Backup Capsule* that has an independent system layout (e.g. a separate partition) and will stay operable should the active file system be damaged. To avoid an accidental removing or unauthorized access of the backup data, this partition is hidden and thus cannot be mounted in the operating system.

  - *Backup to external media (CD/DVD)* to guarantee a high level of data protection as long as the backup media is kept secure.

  - *Backup to a network drive* to stand a better chance of success in case of a hard disk failure.

  - *Backup to an FTP/SFTP server* to provide a new level of system and data protection.

- **Bootable Backup Capsule** to get the choice to launch the Linux or PTS DOS recovery environment every time you start up the computer. With its help you will be able to run utilities under Linux or PTS DOS, and that way to get access to your hard disk for maintenance or recovery purposes.

For PBF images:

- **Smart Backup Wizard** to secure system and data with the minimal efforts possible. With a unique intelligent work algorithm and a highly intuitive user interface, you can easily back up exactly what you need - the whole system, e-mail databases (MS Outlook, Express, Windows Mail) media files or office documents of the My Documents folder, or any other files and folders.
- **Differential backup** to a sector image to only archive changes since the last full sector-based image, thus considerably saving the backup storage space. To restore this kind of backup you will require a full image and one of its differentials.

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- **Incremental backup to a file image** to only archive changes since the last full or incremental file-based image. An incremental image is smaller and takes less time to create, but you will require the initial full image and all of its increments to restore the latest point of this kind of backup.
- **File backup to a sector image**. It is a unique technology on the market so far that bridges two principally different approaches of the data backup: the file-based backup and the disk imaging backup. With its help you can now create a sector-based backup of your system to get it back on track in minutes in case of a virus attack or a hardware malfunction and then just make file-based incremental images to the previously created sector-based backup to keep updated only information that is critical for you. Thus you will considerably save your system resources.

For virtual containers:

- **Backup to VD Wizard** to back up exactly what you need (OS, individual volumes, email databases, media files, documents, etc.).
- **Incremental Backup to VD Wizard** to create incremental backup chains based on the full image.
- **File Complement to VD Wizard** to create a file-level incremental update to a sector-level virtual container.

Restore Facilities

- **Restore an entire disk, separate partitions or only files you need** from the previously created backup image (for PBF and virtual containers).
- **Restore with Shrink** to restore a backup image to a free block of smaller size taking into account only the amount of actual data of the image.
- **Adaptive Restore** to successfully migrate a Windows physical system to a different hardware platform (P2P) by allowing automatic injection of all required drivers and the other actions crucial for a migration of this kind.

This feature is only available for the bootable recovery environment.

Copy Facilities

- **Migrate OS to SSD** to move any Windows OS since XP from a regular hard disk to a fast SSD (Solid State Drive) even of a smaller capacity, thanks to advanced data exclusion capabilities.
- **Partition/hard disk copy** to successfully transfer all on-disk information including standard bootstrap code and other system service structures, thus maintaining the operating system's working capability.

Copy functionality can also be used as an alternative way of data protection.

Virtualization Facilities

- **P2V Copy** to migrate a Windows physical system to a virtual environment in the online mode.
- **P2V Adjust** to recover the startup ability after unsuccessful virtualization with a 3rd party tool.

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Virtualization is the latest trend in the system migration, protection, and evaluation.

Boot Management Facilities

- **Boot Manager Setup Wizard** to easily manage several operating systems on one computer.

Partition/Hard Disk Management Facilities

- **Basic functions for initializing, partitioning and formatting hard disks** (create, format, delete). Instead of the standard Windows disk tools, the program supports all popular file systems.
- **Express Create Partition Wizard** to create a new partition in the most appropriate place of a hard disk, format it to NTFS and then make it available in the system by assigning a drive letter.
- **Split Partition Wizard** helps you separate OS and data or different types of data by splitting one partition to two different partitions of the same type and file system.
- **Merge Partitions Wizard** to consolidate the disk space, which originally belongs to two adjacent partitions (NTFS, FAT16/FAT32), into a single, larger partition.
- **Redistribute Free Space Wizard** to increase free space on one partition by up-taking the on-disk unallocated space and the unused space of other partitions.
- **Express Resize Partitions Wizard** to increase free space on one partition by up-taking the unused space of an adjacent partition of a hard disk (including partitions of Apple Boot Camp).
- **NTFS hot resize upward** to enlarge an NTFS partition (system, locked) without rebooting Windows and interrupting its work.
- **Convert a file system** (FAT16/32, NTFS, Apple HFS) without reformatting.
- **Mount a partition** (assign a drive letter) of any file system type to make it available for your operating system.
- **Modify file system parameters** (make active/inactive, hide/unhide, etc.).
- **Install New OS Wizard** to make a system ready to install a new operating system.
- **Undelete Partitions Wizard** to recover an accidentally deleted partition.

File System Optimization Facilities

- **MFT defragmentation and shrinking** to improve performance of NTFS.

Wipe Facilities

- **Data wiping** to successfully destroy all on-disk information including the standard bootstrap code and other system service structures.
- **Free space clearing** to destroy any remnants of deleted files/directories left on disk without affecting the used data.

Automatization Facilities

- **Task scheduling** to automate routine operations. It can be particularly effective when you have to repeat a sequence of actions on a regular basis.

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Scheduling is only available for the Windows installation of the program.

Auxiliary Facilities

- **Conversion of basic MBR disks to basic GPT** to enjoy all benefits of the newest partitioning scheme with minimal effort.
- **File Transfer Wizard** to make such operations as transferring of files/directories or burning of them to CD/DVD as easy and convenient as possible. Providing access to Paragon backups as regular folders, it may also help to replace corrupted data from a previously created image in case of an operating system failure.
- **Volume Explorer** is a handy tool when you have different file systems on the disk, whether they contain an operating system or just data. Volume Explorer will let you explore a file system of any type and provide access to the necessary files and directories regardless of their security attributes.
- **Check Integrity Wizards** to check integrity of created .pbf images and virtual containers. The function allows distinguishing between valid and corrupted images before using them.
- **Network Configuration Wizard** to establish a network connection on a bootable recovery media either to save a backup of a partition/hard disk or just several files on a network computer or retrieve a previously made backup from a network computer for recovery purposes.
- **Boot Corrector** to fix most of the system boot problems that can be a result of a human factor, program error or a boot virus activity.

Boot Corrector is only available for the bootable recovery environment.

Supported Data Erasure Algorithms

- US DoD 5220.22-M
- Custom algorithm

To know more on the subject, please consult the Data Security Standards section.

Supported Technologies

Along with using innovative technologies from outside, Paragon has developed a number of its own original technologies that make its products unique and attractive for customers:

- **Paragon Hot Backup™** technology to back up locked partitions and hard disks under Windows NT+ family operating systems providing both high operating efficiency as well as low hardware requirements.
- **Paragon Hot Copy™** technology to copy locked partitions and hard disks under Windows NT+ family operating systems providing both high operating efficiency as well as low hardware requirements.
- **Paragon Adaptive Restore™** technology to successfully migrate a Windows physical system to a different hardware platform (P2P).

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- **Paragon Power Shield™** technology to provide data consistency in case of a hardware malfunction, power outages or an operating system failure.
- **Paragon UFSD™** technology to browse partitions of any file system including hidden and unmounted, modify and copy files and folders, etc.
- **Paragon Hot Resize™** technology to enlarge NTFS partitions (system, locked) without rebooting Windows and interrupting its work.
- **Paragon Restore with Shrink™** technology to restore a backup image to a free block of smaller size taking into account only the amount of actual data of the image.
- **Paragon Smart Partition™** technology to securely perform hard disk partitioning operations of any complexity.
- **Paragon BTE™** technology to set tasks for execution during the system restart, thus saving from the need to use a bootable media when modifying system partitions.
- **Microsoft Volume Shadow Copy Service** (VSS) to provide the copy/backup infrastructure for the Microsoft Windows XP/Vista/7/Server 2003/2008 operating systems. It offers a reliable mechanism to create consistent point-in-time copies of data known as shadow copies. Developed by Microsoft in close cooperation with the leading copy/backup solution vendors on the market, it is based on a snapshot technology concept.
- **GUID Partition Table** (GPT). It is the next generation of a hard disk partitioning scheme developed to lift restrictions of the old MBR. GPT disks are now supported by Windows Vista/7, Server 2008, Mac OS X and Linux.

Supported Virtualization Software

Supported virtual hard drive types

- VMware - Virtual Machine Disk Format (VMDK)
- Microsoft - Virtual Hard Disk (VHD, VHDX)
- Oracle - Virtual Desktop Image (VDI)
- Paragon's backups (PBF/pVHD)

Supported virtual machines for P2V scenarios

- Microsoft Virtual PC
- VMware Workstation
- VMware Fusion
- Oracle VirtualBox 4.0

Supported File Systems

- Full read/write access to FAT16/FAT32 partitions.
- Full read/write access to NTFS (Basic Disks) under Windows, Linux and PTS DOS. Compressed NTFS files are also supported.
- Full read/write access to Ext2FS/Ext3FS/Ext4FS partitions.
- Full read/write access to reFS partitions.
- Limited read/write access to Apple HFS+ partitions.

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Unfortunately, support of non-Roman characters for the HFS+ file system is unavailable at the moment. The company is about to implement it in the nearest future.

Supported Media

- Support of both MBR and GPT hard disks (2.2TB+ disks included)
- IDE, SCSI and SATA hard disks
- SSD (Solid State Drive)
- AFD (Advanced Format Drive)
- Non-512B sector size drives
- CD-R, CD-RW, DVD-R, DVD+R, DVD-RW, DVD+RW, DVD-R, DVD+R double layer and also Blu-ray discs
- FireWire (i.e. IEEE1394), USB 1.0, USB 2.0, USB 3.0 hard disks
- PC card storage devices (MBR and GPT flash memory, etc.)

Getting Started

In this chapter you will find all the information necessary to get the product ready to use.

System Requirements

For the Windows installation package

- Windows XP SP3
- Windows Vista
- Windows 7
- Windows 8
- Windows 8.1
- Windows 10 Technical Preview

Additional requirements:

- To install and run the product the target OS should have Visual Studio C++ 2010 Runtime Library installed (comes with the installation package – you will be prompted to install it, if it's not been found in the system).

For the Linux bootable environment

- Intel Pentium CPU or its equivalent, with 300 MHz processor clock speed
- 256 MB of RAM
- SVGA video adapter and monitor
- Keyboard
- Mouse

For the WinPE bootable environment

- Intel Pentium III CPU or its equivalent, with 1000 MHz processor clock speed
- At least 1 GB of RAM

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- SVGA video adapter and monitor
- Keyboard
- Mouse

Additional requirements

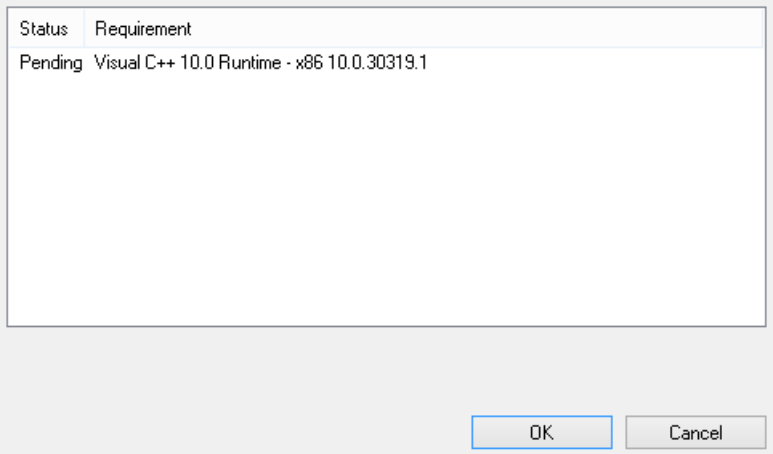
- Network card to send/retrieve data to/from a network computer
- Recordable CD/DVD drive to burn data to compact discs
- External USB hard drive to store data.

Installation

Before the installation, please make sure the systems requirements are met. If everything is OK, please do the following to install the product:

In case there is some previous version of the program installed on the computer, the program will offer the user to uninstall it first.

1. Click on the supplied setup file to initiate the installation. First your system will be checked for the presence of Visual Studio C++ 2010 Runtime Library and if not found, you will be prompted to install it (comes with the installation package). Click **Install** to continue.



2. The Welcome page will inform that the application is being installed. Click **Next** to continue.
3. Please Read Paragon License Agreement carefully and then select the appropriate option to accept. Otherwise you won't be able to proceed with the installation. By clicking the **Print** button, the license agreement may also be printed out.
4. Provide your product key and serial number.
5. On the Customer Information page you are to provide the standard customer information, i.e. a user name and an organization. Besides you need to decide whether to make the program available for all users of this computer (if several) or only for the current one.
6. On the next page, click **Change** to install the utility to a different location (by default **C:\Program Files\Paragon Software\Paragon Hard Disk Manager 15 Suite Edition**). Otherwise click **Next** to continue.

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Do not install the program on network drives. Do not use Terminal Server sessions to install and run the program. In both cases, the program functionality will be limited.

7. On the Ready to Install the Program page click **Install** to start the installation or **Back** to return to any of the previous pages and modify the installation settings.
8. The Final page reports the end of the setup process. Click **Finish** to complete the wizard.

First Start

To start Paragon Hard Disk Manager 15 under Windows, please click the Windows Start button and then select **Programs > Paragon Hard Disk Manager™ 15 > Paragon Hard Disk Manager™**.

The program provides wide opportunities in the field of hard disk structure modification, so just to be on the safe side, please make a backup of your data before carrying out any operation.

The first component that will be displayed is called the Express Launcher. Thanks to a well thought-out categorization and hint system, it provides quick and easy access to wizards and utilities that we consider worth using on a regular basis. With its help you can also start up the traditional launcher, the help system or go to the program's home page.

To know more on how to handle the product's interface and accomplish typical operations, please consult the Windows Components chapter.

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Building Recovery Media

WinPE- and/or Linux-based recovery environments should be prepared on-site with Paragon's Recovery Media Builder**.** To know more on the subject, please consult documentation that comes with this utility.

Booting from the Linux/DOS Recovery Media

The Linux/DOS recovery environment can be used to boot your computer into Linux or PTS DOS to get access to your hard disk for maintenance or recovery purposes. It also has the PTS DOS safe mode, which may help in a number of non-standard situations such as interfering hardware settings or serious problems on the hardware level. In this case, only basic files and drivers (such as hard disk drivers, a monitor driver, and a keyboard driver) will be loaded.

Startup

To start working with the Linux/DOS recovery environment, please take the following steps:

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

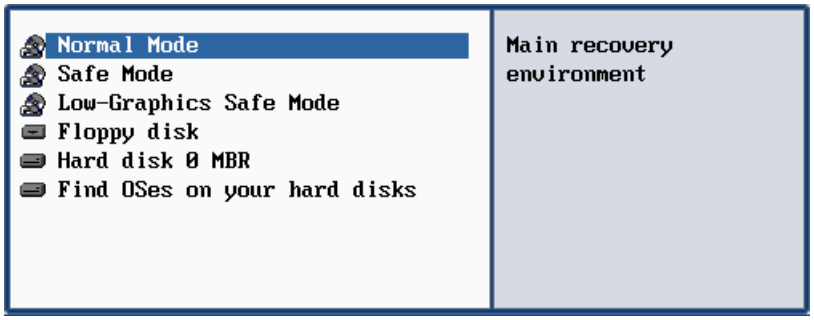
2. Launch a boot mode you need (Normal, Safe, Low-Graphics Safe) in the Boot menu.

By default the Normal Mode will be automatically initiated after a 10 second idle period.

3. Click on the required operation to start. Hints on the selected at the moment item will help you make the right choice.
4. Consult the help system by pressing **ALT+F1** to know more on the subject.

Boot menu

32-bit environment



- **Normal Mode**. Boot into the Linux normal mode. This mode uses the full set of drivers (recommended);
- **Safe Mode**. Boot into the PTS DOS mode. This mode can be used as an alternative of the Linux normal mode if it fails to work properly;

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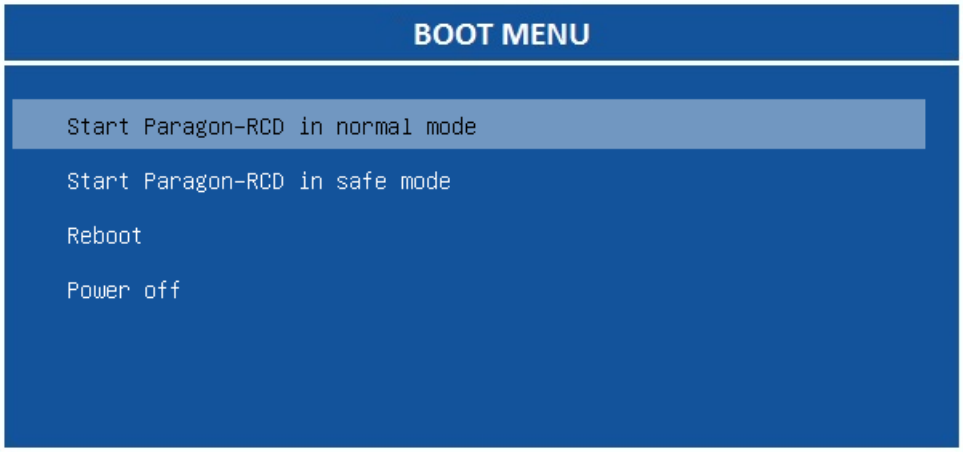
- **Low-Graphics Safe Mode**. Boot into the PTS DOS safe mode. In this case, only the minimal set of drivers will be included, like hard disk, monitor, and keyboard drivers. This mode has simple graphics and a simple menu;
- **Floppy Disk**. Reboot the computer from a system floppy disk;
- **Hard Disk 0**. Boot from the primary hard disk;
- **Find OS(s) on your hard disks**. The program will scan hard disks of your computer to find any bootable operating system.

64-bit environment



- **Normal Mode**. Boot into the Linux normal mode. This mode uses the full set of drivers (recommended);
- **Safe Mode**. Boot into the PTS DOS mode. This mode can be used as an alternative of the Linux normal mode if it fails to work properly;
- **Reboot**. Restart the computer.
- **Power off**. Shut down the computer.

While working with the recovery environment you might experience some inconvenience caused by possible video artifacts. It is just a result of changing video modes and in no way will affect the program functionality. If this is the case, please wait a bit and everything will be OK.

Normal Mode

When the Normal mode is selected, the Linux launch menu appears:

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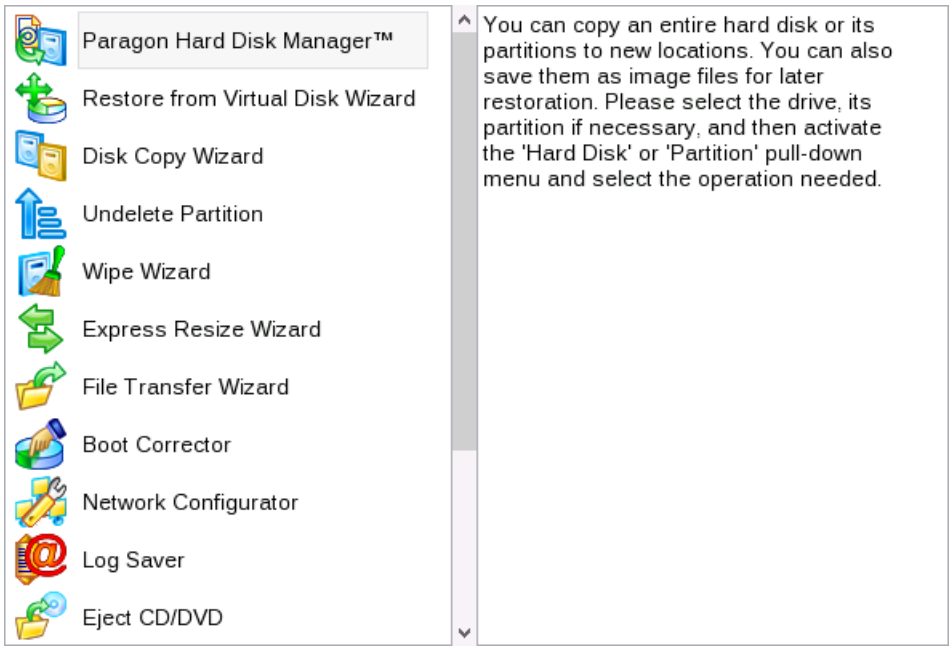

- **Hard Disk Manager** (enables to run wizards and dialogs, to specify program settings, to visualize the operating environment and the hard disk configuration);
- **Restore from Virtual Disk Wizard** (allows restoring hard disks and partitions);
- **Disk Copy Wizard** (helps to clone a hard disk);
- **Undelete Partition** (allows recovery of accidentally deleted partitions);
- **Wipe Wizard** (enables to destroy all on-disk information or only remnants of deleted files/directories);
- **Express Resize Wizard** (enables to increase free space on one partition by up-taking the unused space of an adjacent partition);
- **File Transfer Wizard** (allows coping files/folders to another disk or a partition as well as recording them to CD/DVD);
- **Boot Corrector** (helps to correct the Windows System Registry without Windows being loaded);
- **Network Configurator** (enables to establish a network connection under Linux);

If you are going to use network resources, first launch the Network Configuration Wizard to establish a network connection.

- **Log Saver** (helps to collect and send the necessary log files to the Technical Support);
- **View the mounted partitions** (the list of all mounted partitions will be displayed);

The Linux/DOS recovery environment assigns drive letters to partitions the way it is done in DOS, i.e. one after another, primary partitions at first. Thus mounted partitions may have different drive letters from Windows.

- **Eject CD/DVD**;
- **Command Line** (allows experienced users to execute any operation);

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- **Reboot the computer**;
- **Power off the computer**.

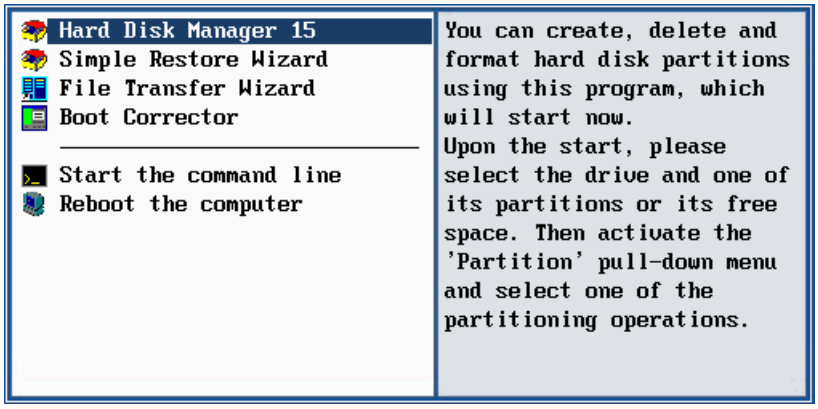
To move within the menu, please use the arrow keys of the computer keyboard.

Safe Mode

When the Safe mode is selected, the PTS DOS launch menu appears. It has nearly the same functionality as for the Normal mode except for the **Network Configurator** and **Log Saver** commands. Besides due to certain limitations of the PTS DOS environment, there is no possibility to burn CD/DVD discs.

Low Graphics Safe Mode

When the Low Graphics mode is selected, the PTS DOS launch menu appears. It has the same functionality and looks similar to the Safe mode but graphically simpler.



Booting from the WinPE Recovery Media

The WinPE recovery environment can be a real alternative to the Linux/DOS recovery environment. Providing nearly the same level of functionality it offers an excellent hardware support and the same interface as the Windows version does.

Startup

To start working with the WinPE recovery environment, please take the following steps:

1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. Once it has been loaded, you will see the Universal Application Launcher. In general it enables to run components of the product, load drivers for undefined hardware or establish a network connection.

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3. Click on the required operation to start. Hints on the selected at the moment item will help you make the right choice.
4. Consult the help system by pressing **ALT+F1** to know more on the subject.

The WinPE based recovery environment offers excellent hardware support. However in case it doesn't have a driver for your disk controller, your hard disks will be unavailable. Please consult the Adding specific drivers scenario to know how to tackle this issue.

Basic Concepts

This chapter explains terms and ideas that show how the program works. To understand these helps to obtain a general notion of the operation performance and makes it easier for the user to operate the program.

System and Data Protection

The data protection issue is a growing cause of worrying for more and more people today. Indeed, it is hardly to find a person who will be particularly happy when all precious information on the hard disk is irreversible lost as a result of its malfunction. So how this tragedy can be prevented?

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File Backup versus Sector Backup

Since the advent of the computer age people were in the search of ways to guarantee data safety. As a result we've got now two principal approaches: the file-based backup and the sector-based backup. The main difference between the two lies in the way data is treated.

A sector-based backup operates with an image (or a snapshot) of the whole disk system or its separate partitions. It not only includes the contents of all user-made files, but additionally contains the exact structure of directories, information about file allocation, file attributes and other related data. Thus it enables to successfully process system or encrypted partitions of any file system type, no matter what kind of information they contain.

In contrast, a file-based backup takes into account a file system structure and only functions on a file or folder level. So it is very efficient when archiving separate files or folders, but in no way will help you back up a system partition.

You should understand pretty well that each of the two approaches is only good when properly chosen. In the comparison table below you can see when this or that approach will suit you at most.

Sector-Based Backup	File-Based Backup
Merits	
It does not dependent on a particular file system. Thus it can successfully process system or encrypted partitions of any file system type, no matter what kind of information they contain.	Functioning on a file/folder level, it is ideal for archiving separate files or folders.
It can create an exact image of a partition, including its service data. Thus it is ideal for a backup/restore of a system partition or a fast deployment to a bunch of identical computers.	It enables to automatically build up contents of the future backup image by using an advanced system of filters.
	It allows archiving data of the same volume with different backup policies.
	It is easy and efficient when creating backup chains.
Demerits	
Resulted backup images may contain a lot of redundant data.	It depends on a file system structure, so you won't be able to process unknown file systems.
It is ineffective when trying to maintain a backup chain, especially when little amount of data is being changed.	It cannot be used to back up a system partition.
	It is much slower when processing large amount of data.

Backup Types

At the present moment the market is offering various types of backup imaging to meet the needs of any user. Besides supporting them all, our program offers a unique backup type, called File Increment to a Sector Backup.

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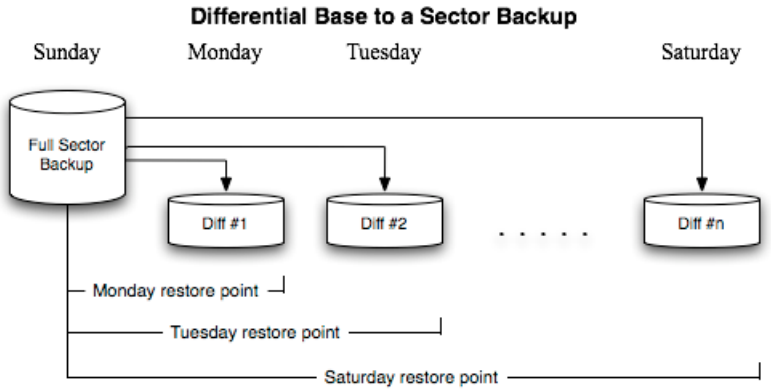
Full, Differential, and Incremental Sector Backups

A full sector-based backup image includes all contents of a partition or a hard disk at the moment of its creation. If you roll back your system to the initial state on a regular basis, that's exactly what you're looking for. But if you want to have multiple backup archives of the same partition reflecting certain time stamps, unchanged data will inevitable be duplicated in all archives and take additional space on backup media. To tackle this issue there has been developed a supplementary technique called Differential Sector Backup.

A differential archive only contains data changed since the time of creating a full archive, which forms a base (or a parental image) in this case, thus considerably saving your system resources. It is realized by the exact bit-wise comparison of the previous partition's data (saved in the parental image) with the current data (that is actually the partition itself). To restore this kind of backup you will require a full image and one of its differentials, what is very convenient.



This function is only available for single primary and logical partitions.

Incremental archive is a further way of optimizing the process of disk imaging. Unlike differentials, it may not only contain data changed since the time of creating a full sector-based archive, but one of its increments as well, thus allowing to save more time and the backup storage. The main principal here is the shorter the interval between increments, the less data is backed up. In general this type of backup is great except for one thing – when you restore an incremental archive there will be processed the initial full image and all increments between, which depending on the size of your backup chain, may take plenty of time. Anyway unlike backups, the restore operation is an emergency, which might not happen at all.

Paragon's incremental sector-based archive employs an innovative technology that significantly improves the backup performance. Its core is in introduction of a special index file (.pfi) that keeps meta-information on the corresponding incremental image. It's much smaller than the image itself and is used to calculate the difference between the current and previous state of a backup object. Thus, when you're going to do an increment to a full archive of your system partition stored on the network, only its index file is processed over the net (a couple of megabytes at most), not the entire image, which minimizes both, the network traffic and backup time. Another new thing is change of a backup format – all increments are saved in .vhd (Virtual Hard Drive) containers.

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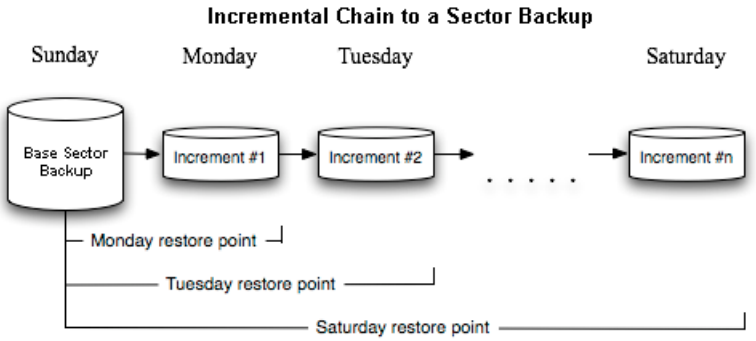


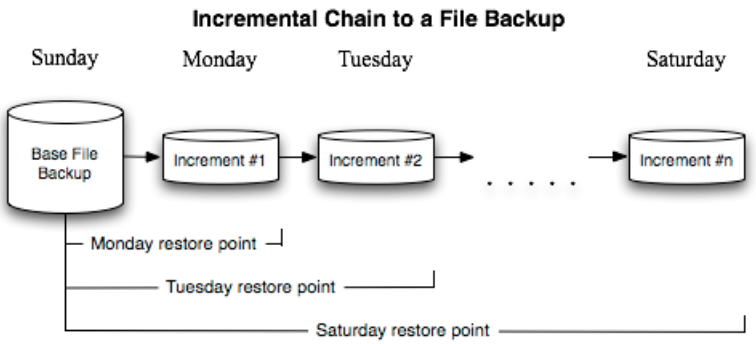
Please note that the current version of the product has a number of limitations regarding sector-based increments:

- Increments can only be created for full archives of the new type (with a .pfi index file). Any of our flagship products since Hard Disk Manager 12 supports this functionality;
- Increments can only be created for full archives stored on a local mounted drive or a network share;
- Increments cannot be created for archives of entire GPT disks;
- Increments can only be restored under Windows (if no restart is needed) or WinPE;
- Increments cannot be processed with the Check Archive Integrity Wizard;
- Increments cannot be processed with the Create File Complement Wizard;
- Increments cannot be browsed in Volume Explorer;
- Increments can only be used with our software;
- Increments cannot be compressed;
- Increments cannot be encrypted;
- Increments cannot be splitted.

Full and Incremental File Backups

A full file-based archive only contains files and folders. It is really efficient when backing up an e-mail database or particular documents, as no redundant data is processed. But if you care about maintaining a files history, you can benefit from one more supplementary technique called Incremental File Backup.

An incremental archive only contains data changed since the time of creating a full or incremental file-based archive. It is smaller and takes less time to create, but you will require the initial full image and all of its increments to restore the latest point of this kind of backup.



File Increment to a Sector Backup

File Increment to a Sector Backup is a unique technology on the market so far that bridges two principally different approaches of the data backup: the file-based backup and the sector-based backup. With its help you can now create a

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sector-based backup of your system to get it back on track in minutes in case of a virus attack or a hardware malfunction and then just make file-based incremental images to the previously created sector-based backup to keep updated only information that is critical for you. Thus you will considerably save your system resources.

Backup Storage

Our program supports several techniques of storing backup images. Let's take a closer look at them all to understand what kind of storage is able to provide better security:

- You can place a backup image to a local partition. Despite the fact that it is the most convenient way, try not to use it. You can delete your backup just by accident or lose it as a result of a hardware malfunction, or a virus attack;
- You can place a backup image to an external mounted storage to provide for a higher level of data protection and system independence;
- You can place a backup image to a special secured place on the hard disk called the Backup Capsule that has an independent system layout (e.g. a separate partition) and will stay operable should the active file system be damaged. To avoid an accidental removing or unauthorized access of the backup data, this partition is hidden and thus cannot be mounted in the operating system. However it won't help you in case of a hardware malfunction;
- You can place a backup image to external media (CD/DVD) to guarantee a high level of data protection as long as the backup media is kept secure;
- You can place a backup image to a network drive to stand a better chance of success in case of a hard disk failure. Moreover, by storing it on a special-purpose server you may be pretty sure nothing will happen to it;
- Finally you can place a backup image to an FTP server to provide a new level of system and data protection.

Known Issues on FTP/SFTP

1. You need to check out yourself Windows Firewall or programs of this kind let our program work with the required port (21 by default).
2. You cannot restore data selectively (with Restore Wizard) from an FTP/SFTP server.
3. You can browse an FTP server in the passive mode only.
4. Parallel access to several FTP/SFTP servers is limited - only one password for all servers is available.

Adaptive Restore

Technology Background

Windows family operating systems are notorious for their excessive sensibility to hardware, especially when it turns to replacement of such a crucial device as HDD controller or motherboard – actually Windows will most likely fail to boot as a result of this operation.

In 2008 our company came with an exclusive technology called Paragon Adaptive Restore™. Initially aimed at restore of Windows Vista or Server 2008 from a backup to a different hardware configuration, its current realization, available in the P2P Adjust OS Wizard, enables to make any Windows OS since XP bootable on dissimilar hardware by allowing automatic injection of all required drivers and the other actions crucial for this type of migration.

Technology Concept

Let's take a closer look at how Paragon Adaptive Restore works.

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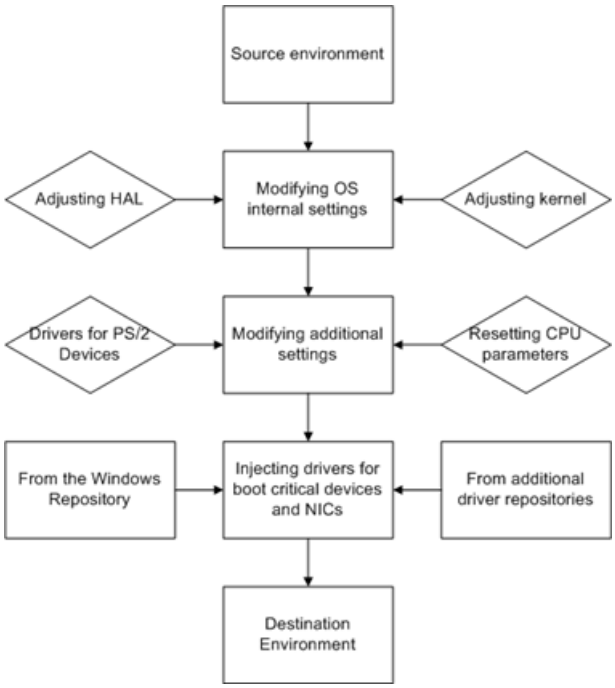

As you see, successful migration of a Windows system to a different hardware platform involves several actions:

1. **Change of the Windows kernel settings according to the new configuration**. The program detects the given hardware profile and automatically installs the appropriate Windows HAL and kernel.
2. **Installation of drivers for boot critical devices**. The program detects those without drivers and automatically tries to install lacking drivers from the built-in Windows repository. If there's no driver in the repository, it prompts the user to set a path to an additional driver repository, strongly recommending not to proceed until all drivers for the found boot critical devices are installed. In case drivers for these devices are installed, but disabled, they will be enabled.
3. **Installation of drivers for a PS/2 mouse and keyboard**. This action will only be accomplished for Windows XP/Server 2003.
4. **Installation of drivers for network cards**. The program detects those without drivers and automatically tries to install lacking drivers from the built-in Windows repository. If there's no driver in the repository, it prompts the user to set a path to an additional driver repository.

These actions guarantee a Windows system will start up on dissimilar hardware. After the startup, Windows will initiate reconfiguration of all Plug'n'Play devices. It's a standard procedure, so please don't worry and prepare the latest drivers at this step to get the most out of the system.

Though all Windows systems have built-in driver repositories, please be prepared to have additional drivers when dealing with Windows XP/Server 2003, because for these systems they are very modest.

Technology Application

Let's consider a number of situations when the Adaptive Restore technology can help you out:

- If you need to migrate to a different hardware platform with minimal effort
- If you need to upgrade hardware while keeping all programs and settings intact
- If you need to replace failed hardware and cannot find an exact match for original system specifications

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Known Issues

1. After transferring Microsoft Vista and later versions to different hardware, you will need to re-activate license of the system. It's normal behavior as these systems keep tracking any change of hardware. Re-activation is legally justified in this case, as you transfer your system to another PC.
2. If you've installed several operating systems on one partition, we can only add drivers to the latest version of OS. Microsoft highly recommends that you install an operating system on a separate partition.
3. Please note drivers are not cached during selection. That's why if you select a driver to add to the system, but it's already unavailable during the operation, the program will end the operation with an error.

System Virtualization

With new powerful x86 computers, system virtualization has become extremely popular. It's a software technology that enables to run several virtual machines on one physical machine, providing resources of that single computer are shared across several environments. As a result one and the same physical computer can have multiple OSs and applications operating simultaneously, thus opening up enormous opportunities for both, business and home users, exactly:

- Avoid underutilization of up-to-date powerful computers;
- Increase flexibility of a physical infrastructure;
- Provide for increased availability of hardware and applications;
- Cut expenses on hardware and energy;
- Guarantee smooth and cost saving system migration;
- Enjoy working with old applications you can't launch on your current PC;
- Take advantage of having multiple operating systems on one Windows PC, including Linux, Mac OS X, etc.;
- Forget about hunting for replacement of the failed hardware, and many more…

Known Issues

1. You should install integration services (e.g. VMware Tools) on the virtual system yourself. We only guarantee its smooth startup.
2. After transferring Microsoft Vista and later versions to a virtual disk, you will need to re-activate license of the system. It's normal behavior as these systems keep tracking any change of hardware. Re-activation is legally justified in this case, as you transfer your system to another PC.
3. If your system hosts several Windows OSes, our program will find them all and automatically patch to run in a virtual environment. However we cannot guarantee smooth startup of all found Windows systems, but the guest OS, for its configuration parameters may be incompatible with the others.

Paragon Hot Processing & Volume Shadow Copy Service

Offline versus Online Data Processing

In the course of time there have been developed various methods of data processing. Despite different work concept, all of them can be divided into two principal groups: offline (cold) and online (hot) data processing techniques.

As the name infers, offline data processing can only be accomplished when the data is in consistent state (the operating system and all the applications are completely shut down). Actually it is the most preferable way of image creation or

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data cloning, since software can obtain an exclusive right to process data that guaranties high level of operating efficiency. However, the offline data processing is absolutely out of question when dealing with 24/7 production environments.

In contrast, online data processing enables to create a consistent snapshot even as the data is currently modified. It is particularly useful for systems with high availability requirements, but it won't be accomplished until all active transactions are complete. The point is to provide a coherent state of all open files and databases involved in a process, taking into account that applications may still keep writing to disks. As a result an online data processing cannot boast high operating speed.

Our program supports both offline and online methods of data processing. As far as online method is concerned it offers its own hot processing algorithm together with the possibility to use snapshot technologies provided by the Microsoft VSS framework.

Paragon Hot Processing Technology

Paragon Hot Processing is an online copy/backup technology for Windows NT+ family operating systems. Developed back in 2001, nowadays it is integrated with all copy/backup solutions offered by the company.

Paragon Hot Processing is not exactly a snapshot technology, though it has much in common with it. During an online copy/backup, the program uses the kernel mode driver HOTCORE.SYS to intercept and control disk write activity of applications and the operating system. The hotcore driver as an integral part of the program is installed during the setup procedure (that's why the system reboot is required to complete the setup procedure). For the most part the driver is in the idle mode until it is activated with the program. While in this mode it bypasses any calls having no effect on the overall system performance, but a few kilobytes of the system memory.

Paragon Hot Processing technology offers copy/backup of locked partitions and hard disks under Windows NT+ family operating systems providing both high operating efficiency as well as low hardware requirements.

It is not recommended to use Paragon Hot Processing with active SQL Server, Exchange or Oracle databases since the backup image contents may be corrupted.

Volume Shadow Copy Service

Microsoft Volume Shadow Copy Service (VSS) is designed to provide the copy/backup infrastructure for the Microsoft Windows XP/Vista/Server 2003/2008 operating systems. It offers a reliable mechanism to create consistent point-in-time copies of data known as shadow copies. Developed by Microsoft in close cooperation with the leading copy/backup solution vendors on the market, it is based on a snapshot technology concept.

Initiated by a VSS aware copy/backup utility, VSS creates snapshots for the selected volumes and represents them as virtual read-only devices, called volume shadow copies. Once the shadow copies are created, the copy/backup utility starts processing the data while applications keep writing to original volumes.

Unlike Paragon Hot Processing the VSS technology provides a unique possibility to make a synchronous snapshot of multiple volumes. This very feature can be particularly beneficial when backing up active SQL Server 2003, Exchange 2003 or Oracle databases located on multiple volumes the way it is recommended by Microsoft to improve the level of database performance and reliability, thus providing 100-percent data consistency.

To use VSS it is necessary to have a mounted 300 MB+ NTFS partition.

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pVHD Support

Paragon introduces a pVHD (Paragon Virtual Hard Drive) format – a special VHD, optimized for storing backups of virtual and physical machines. It's very efficient in handling incremental chains, data de-duplication and synchronization. pVHD allows obtaining backups that are up to four times smaller than original backup objects.

In the current version of the product backup images can be made either in the old PBF or the new pVHD. Please note that the pVHD support has a promotional goal. In future releases pVHD will gradually take the primary role.

Below is the list of wizards that allow working with pVHD:

- Backup to VD Wizard (Linux, Windows, WinPE);
- Incremental Backup to VD Wizard (Linux, Windows, WinPE);
- File Complement to VD Wizard (Linux, Windows, WinPE);
- Restore from VD Wizard (Linux, Windows, WinPE);
- Check VD Integrity Wizard (Windows, WinPE).

What you get by using pVHD:

- Incremental imaging works much faster and rock-stable in comparison with the old PBF;
- Only pVHD images can be used to do immediate virtualization;
- With the new backup technology, available for customers as a new backup image format pVHD, Paragon has also achieved easy support of any virtual containers (VMDK, VHD, VHDX).

GPT versus MBR

GUID Partition Table (GPT) is the next generation of a hard disk partitioning scheme developed to lift restrictions of the old MBR. Being a part of the Extensible Firmware Interface (EFI) standard proposed by Intel to replace the outdated PC BIOS, it offers a number of crucial benefits:

- Up to 128 primary partitions for the Windows implementation (only 4 in MBR);
- The maximum allowed partition size is 18 exabytes (only 2 terabytes in MBR);
- More reliable thanks to replication and cyclic redundancy check (CRC) protection of the partition table;
- A well defined and fully self-identifying partition format (data critical to the platform operation is located in partitions, but not in un-partitioned or hidden sectors as this is the case with MBR)

uEFI Boot Challenges

Introduced back in 2005 by Intel to lift restrictions of the old MBR (Master Boot Record) and PC BIOS (Basic Input/Output System), uEFI (Unified Extensible Firmware Interface) is now a recommended platform for new 64-bit Windows 8 computers. And the reason is easy to catch – besides other unique features impossible for the traditional tandem of BIOS+MBR, only a uEFI-based platform enables to accommodate Windows OS on a partition larger than 2.2TB.

Despite all uEFI advantages however, it has one quite naughty issue: a pretty standard operation with a bootable device for instance involving its connection to another SATA port results in unbootable Windows. You'll get the same result if trying to boot from a cloned system hard disk or from a restored hard disk. All these problems originate from the way uEFI+GPT bundle is organized.

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Microsoft provides how-to guides to tackle this type of problems, but they demand a great deal of experience from the user, involving the use of the **cmd**, **diskpart** and **bcdedit** tools.

Paragon has a better way! Introducing an elegant technology, realized at the user side as one simple option, you can define a system GPT volume you're willing to boot from.

Below is a list of wizards where the uEFI switch boot device option can be found:

- Copy Hard Disk Wizard;
- Copy Partition Wizard;
- Restore Wizard;
- Migrate OS to SSD Wizard;
- Boot Corrector.

The uEFI switch boot device option is only available through the 64-bit WinPE media at the moment.

Apple Boot Camp

Boot Camp is a special utility to help you set up a dual boot system (Mac OS X and 32-bit Windows XP/Vista) on Intel-based Macs. It enables to securely re-partition your hard disk (resize an existing HFS+ partition to create a separate partition for Windows) and then launch the installation process. With Boot Camp all the necessary drivers will be at your disposal. Moreover after Windows has been installed it will serve as a boot manager to choose what operating system to start up.

It is strongly recommended not to modify the hard disk configuration with Windows Disk Manager. Otherwise it may lead to unexpected consequences, right up to BSOD and inability to boot in Windows XP/Vista. Please use our program to correctly update both MBR and GPT.

64-bit Support

The bulk of software today is written for a 32-bit processor. It can meet the requirements of almost any end user. However that is not the case when dealing with servers processing large amounts of data with complex calculations of very large numbers. That is where 64-bit architecture comes into play.

It can boast improved scalability for business applications that enables to support more customer databases and more simultaneous users on each server. Besides a 64-bit kernel can access more system resources, such as memory allocation per user. A 64-bit processor can handle over 4 billion times more memory addresses than a 32-bit processor. With these resources, even a very large database can be cached in memory.

Although many business applications run without problems on 32-bit systems, others have grown so complex that they use up the 4 GB memory limitation of a 32-bit address space. With this large amount of data, fewer memory resources are available to meet memory needs. On a 64-bit server, most queries are able to perform in the buffers available to the database.

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Some 32-bit applications make the transition to the 64-bit environment seamlessly others do not. For instance, system-level utilities and programs that provide direct hardware access are likely to fail. Our program offers a full-fledged support of the 64-bit architecture providing fault-tolerant work for such system dependent modules as Hot Processing.

Copy Operations

Hard drive duplication nowadays is becoming highly popular among PC users. That is due to some definite advantages it can offer. First of all, many people clone hard disks just to back up data for security reasons. The present day copy utilities enable to successfully transfer all on-disk information including standard bootstrap code and other system service structures, thus maintaining the operating system's working capability. In case of a system malfunction, the user can get the system back on track in minutes. No additional configuration is required, what is very convenient.

The second possible application is the upgrade of a hard disk to a new one. The capacity of a modern hard drive doubles every two years, thus opening up new possibilities for software developers. As a result programs become more complicated and require considerable amount of free space. One day the user realizes that there is no more free space left on the hard disk and the only way out is to upgrade. Usually that means that besides purchasing a new hard disk, the user is to face a large re-installation procedure spanning several days of tedious work. But all of this can be avoided just by copying the contents of the old hard disk to a new one proportionally resizing the partitions.

And the last but not least is the copying of hard disks for cloning purposes. It may be of great use when setting up similar computers. There is no need for a system administrator to install an operating system from scratch on every one of them. It is enough just to configure one and then clone it to the others.

Drive Partitioning

As you probably know a hard drive is to be split into one or more partitions, since it cannot hold data until it is carved up and space is set aside for an operating system. Until recently most PCs used to have just one partition, which filled the entire hard disk and contained an OS. The situation has changed however, thanks to new cost-effective high capacity hard drives, thus opening up numerous possibilities for PC users, such as editing video, archiving music, backing up CD images, etc. Huge increase in space is great, but it poses a number of problems, most important of which are effective data organization and speed.

Large drives are always going to take longer to search than smaller volumes, and an operating system is going to have its work cut out both finding and organizing files. It is for this reason that many people decide to invest in multiple hard drives, but there is an easy solution – drive partitioning. Partitioning lets you divide a single physical drive into a number of logical drives, each of which servers as a container with its own drive letter and volume label, thus enabling the operating system to process data more efficiently. Besides partitioning makes it possible to organize data so that it is easy to find and manage. You can set aside, for instance, 40 GB of a 160 GB hard drive for the OS, 70 GB for storing video and another 50 GB for your favorite music collections to provide transparent data storage.

It is also worth mentioning to that with a hard drive properly partitioned, such routine operations as files de-fragmentation or consistency check will not be that annoying and time-consuming any more.

By detaching the OS from the rest of the data you can tackle one more crucial issue – in case of a system malfunction, you can get the system back on track in minutes by recovering it from a backup image located on the other partition of the hard drive.

But that is not all drive partitioning may be used for. If you are willing to play games in Windows while browsing the Internet in Linux, 100-percent sure that no virus will attack your PC, drive partitioning is a necessity. In order to run several OSs on a single hard drive you are to create a corresponding number of partitions to effectively delineate the boundaries of each OS.

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Data Sanitization

Data security is a two-sided problem. It is to be made clear, that providing confidentiality implies not only information to be stored properly, but also be destroyed according to certain rules. The first step to protecting yourself is to know exactly which security precautions work and which do not.

Many people believe the misconception that repartitioning a disk will result in complete destruction of its contents. Actually that is not quite so. Repartitioning the drive only alters references to partitions in the Partition Table, leaving all file data intact. In fact, there are a number of programs available to successfully recover previously deleted partitions.

Formatting a drive also does not guarantee data destruction. Formatting procedure implies modification of the Master File Table (MFT) that keeps track of where file contents are stored on the disk and verification of each sector for consistency. Even a low-level format does not actually erase the file contents for good, since they can still be resurrected from their deleted state with minimal effort by using the popular today Magnetic Force Microscopy technology.

The only way to make sure that all the data has been erased from a hard drive is to overwrite all on-disk sectors with random patterns of ones and zeros. Although this sounds complex, there is an easy way to do this.

The process of deliberately, irreversibly removing or destroying the data stored on a memory device (magnetic disks, flash memory drives, etc.) is generally known as Data Sanitization. A device that has been sanitized has no usable residual data and even advanced forensic tools should not ever be able to recover it, thus providing maximum level of security.

Data Security Standards

To irreversibly destroy all on-disk information there have been developed a number of disk sanitizing standards. They are distinguished by wiping patterns and number of passes:

1. **US DoD 5220.22-M**. US Department of Defense recommends to overwrite all addressable locations with a character, its complement and then a random character. Finally, the target data area is to be verified;

2. **US Navy standards NAVSO P-5239-26**.

    - **NAVSO P-5239-26 for RLL encoded drives**. At first to write the fixed value (0xffffffff) to the target data area, then the fixed value (0x27ffffff), and then random values. Finally, the target data area is to be verified;
    - **NAVSO P-5239-26 for MFM encoded drives**. At first to write the fixed value (0xffffffff) to the target data area, then the fixed value (0xbfffffff), and then random values. Finally, the target data area is to be verified;

3. **British HMG Infosec Standard No.5**. At first to write a single character pattern, then its complement and then a random character. Finally, the target data area is to be verified;

4. **German VSItR Standard**. Overwrite the deleted information 7 times, consistently filling it with the following patterns: 0x00, 0xFF, 0x00, 0xFF, 0x00, 0xFF, 0xAA. Finally, the target data area is to be verified;

5. **Australian ASCI 33**. Overwrite with a character (C), then verify. Overwrite with –C (the first pass character's inverse), then verify again. Overwrite everything with both C and –C once again but without verification. Fill everything with random characters;

6. **Russian GOST R 50739-95**. Destroy information by a single pass with writing random characters into each sector byte;

7. **Peter Gutmann's algorithm**. A whopping 35 passes, with 27 random-order passes using specific patterns combined with eight passes using random patterns;

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8. **Bruce Schneier's algorithm**. Two passes of specific patterns followed by five passes using a cryptographically secure pseudo-random sequence;

9. **Paragon's algorithm**.

   - Overwrite each sector with a forcefully randomized 512-byte string, new for each sector, using CSPRNG (cryptographically secure pseudo-random number generator);
   - Overwrite each erased sector with its complement;
   - Overwrite each sector with a 512-byte string (CSPRNG), again forcefully randomized and different from the first pass, and new for each sector;
   - Fill each erased sector with 0xAA value. Finally, the target data area is to be verified.

Military and government standards always require 100 percent residual data verification. It is necessary to make sure that the operation has been properly accomplished. Besides corrupted sectors discovered during the operation are to be logged to keep the user informed, since these sectors may contain classified information.

The list of supported military and government standards may vary for your product. Anyway you've always got the possibility to create a customized algorithm, defining up to 4 wiping patterns, number of passes for each wiping pattern and for the group of patterns, thus providing the maximum possible security level.

Scheduling

The automation of operations is particularly effective when you have to repeat a sequence of actions on a regular basis. For example, developing a specific project on a day-to-day basis and having to make a backup every evening so as not to lose the valuable data, you will really appreciate, when this kind of routine operations will be carried out automatically without your participation.

Another aspect of any automation process is that it allows an optimization of your computer's work-load. This is especially important when operations require a considerable amount of computer resources – processor time, memory and more. A number of tasks, which can decrease the performance, can be run during the night or whenever the computer has the least work-load to perform.

The program has a special tool for scheduling. You can set out a timetable for any operation and it will start at a specified time without interrupting your current activity.

Windows Components

In the given section you can find all the information necessary to successfully work with the Windows version of the product.

Interface Overview

This chapter introduces the graphical interface of the program. The design of the interface precludes any mistake being made on the part of the user. Most operations are performed through the system of wizards. Buttons and menus are accompanied by easy understandable icons. Nevertheless, any problems that might occur while managing the program can be tackled by reading this very chapter.

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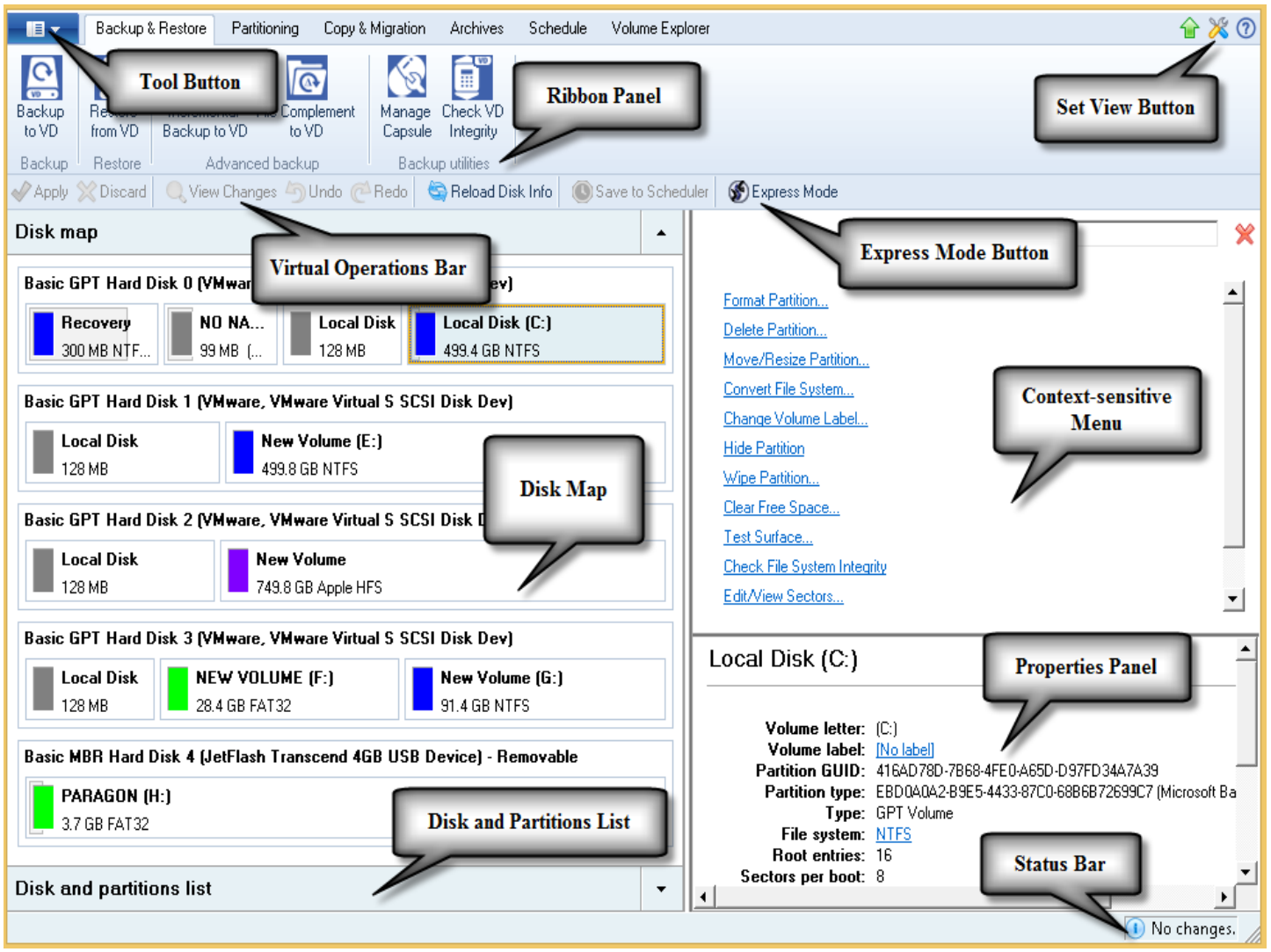
General Layout

When you start the program, the first component that is displayed is called the Launcher. It enables to run wizards and dialogs, to specify program settings, to visualize the operating environment and the hard disk configuration.

The Launcher's window can be conditionally subdivided into several sections that differ in their purpose and functionality:



1. Tool Button
2. Ribbon Panel
3. Set View Button
4. Virtual Operations Bar
5. Express Mode Button
6. Disk Map
7. Disk and Partitions List
8. Context-sensitive Menu
9. Properties Panel
10. Status Bar

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A number of panels offer similar functionality with a synchronized layout. The program enables to conceal some of them to simplify the interface management.

Tool Button

By clicking on this button the user can:

- Launch auxiliary wizards,
- Get access to the program settings,
- Collect and send a log files package to the Support Team,
- Go to Paragon's website to download a free update, register the product, visit Paragon's Knowledge Base, etc.

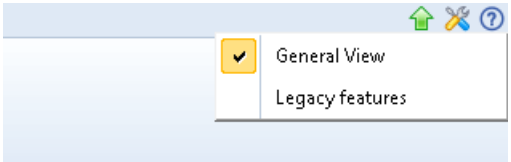
Ribbon Panel

An area across the top of the program's window is called the Ribbon Panel. It makes almost all the product capabilities available to the user in a single place. A Ribbon Tab is an area on the panel that contains buttons organized in groups by functionality. Each button corresponds to a certain program wizard or dialog.

If you'd like to hide all ribbon tabs, click on the arrow button at the right top corner of the program window.

Set View Button

You can adjust the working environment by choosing one of two predefined views: general and legacy. This division is quite logical, allowing the user to filter out legacy wizards and dialogs that have to do with the old PBF backup format. Please note that the legacy mode is not active by default.



Virtual Operations Bar

The program supports previewing the resulting layout of hard disks before actually executing operations (so-called virtual mode of execution). In fact, when the virtual mode is enabled, the program does not accomplish operations immediately, but places them on the List of Pending Operations for later execution.

The Virtual Operations Bar enables to manage pending operations.

BUTTON	FUNCTIONALITY
	Cancel the last virtual operation on the List of Pending Operations
	Cancel the last undo virtual operation on the List of Pending Operations
	Display the List of Pending Operations
	Launch the real execution of virtual operations
	Cancel all virtual operations on the List of Pending Operations
	Schedule pending operations

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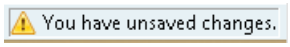
Virtual mode is an effective way of protection from any troubles, since no operations will be executed until clicking the Apply button for confirmation, thus giving a second chance to weigh all pros and cons of this or that particular operation. The program politely reminds the user that there are unsaved changes by showing the following window:



Express Mode Button

By clicking on this button the user can switch to the express mode of operation at any time.

Disk Map

As the name infers, the Disk Map displays the layout of physical and logical disks. Physical disks are represented with rectangle bars that contain small-sized bars. These small-sized bars represent logical disks. Their color depends on the file system of the appropriate partition. By looking at the size of the bar's shaded area it is possible to estimate the used disk space. For the selected at the moment object there's the possibility to call a context-sensitive popup menu with available operations.

Large-sized bars display the following information about physical disks:

- Type (basic or dynamic MBR/GPT),
- Manufacturer,
- Model.

Small-sized bars display the following information about logical disks and blocks of free space:

- Volume label (if exists),
- Drive letter,
- Total size,
- File system.

The Disk Map is synchronized with the Context-sensitive Menu and the Properties Panel. Thus by selecting a disk on the map, the two will automatically display detailed information on it. To know more on the subject, please consult the Viewing Disk Properties chapter.

Since the Disk Map and the Disk and Partitions List have the same purpose, the user is allowed to extend only one at the moment by using a corresponding arrow button.

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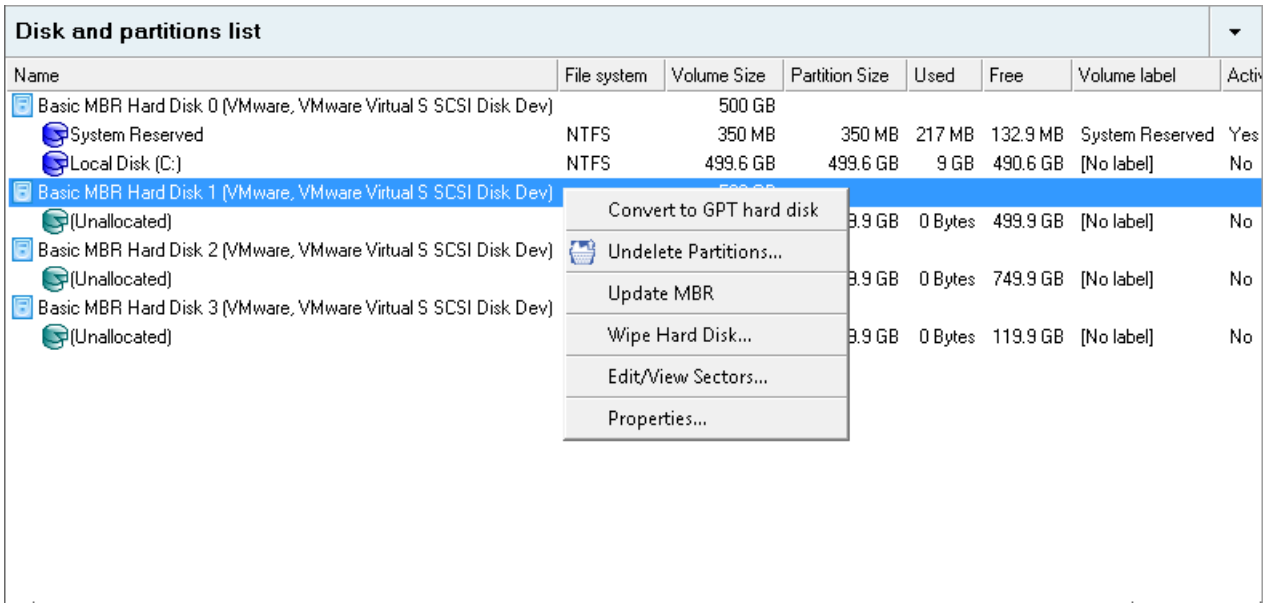
Disk and Partitions List

The Disk and Partitions List is another helpful tool that helps to get a clear-cut picture on the current state of the system hard disks and partitions. All objects (disks, partitions, or blocks of free space) on the list are sorted according to their starting position. For every item there is the possibility to call a context-sensitive popup menu with available operations.



The Disk and Partitions List provides detailed information on all hard disks and partitions found in the system including the following properties:

- Name,
- Volume label (if exists),
- Drive letter,
- File system type,
- Volume size,
- Amount of used and unused (free) space,
- Active/Inactive attribute,
- Hidden/Unhidden attribute.

The Disk and Partitions List is synchronized with the Context-sensitive Menu and the Properties Panel. Thus by selecting a disk on the list, the two will automatically display detailed information on it. To know more on the subject, please consult the Viewing Disk Properties chapter.

Since the Disk Map and the Disk and Partitions List have the same purpose, the user is allowed to extend only one at the moment by using a corresponding arrow button.

Context-sensitive Menu

The Context-sensitive Menu shows a list of operations available for an object (disk, partition, or block of free space) selected either on the Disk Map or the Disk and Partitions List. If you click a corresponding record the appropriate wizard or dialog will be started. All default values for the operation parameters will correspond to the object's settings. If there too many items on the list, type in the first word of the required command in the **Search commands** field to filter the list.

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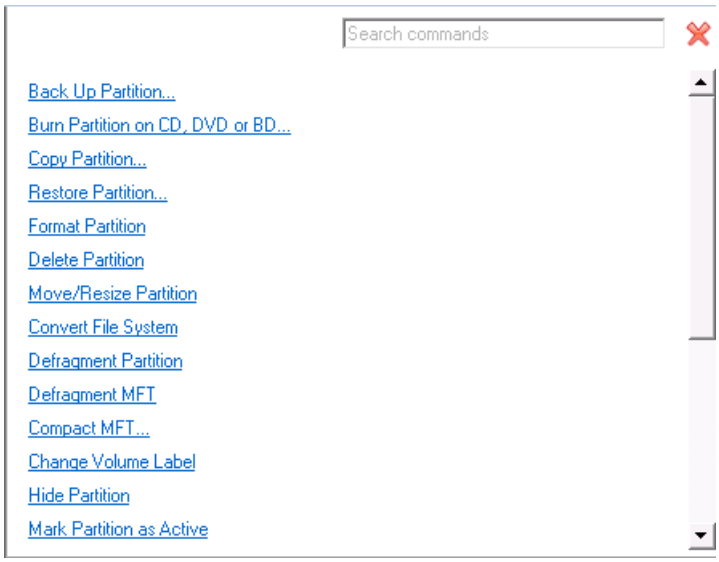
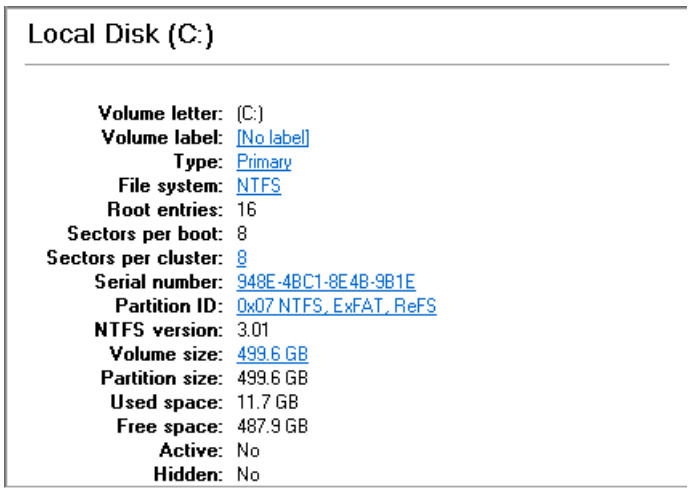


Properties Panel

The Properties Panel provides information on the object (disk, partition, or block of free space) selected either on the Disk Map or the Disk and Partitions List.



The Properties Panel helps to obtain the following data:

For a hard disk

- Model,
- Serial number,
- Type of hard disk (basic or dynamic MBR/GPT),
- Total size (in GB),
- Information on geometry of the disk (amount of sectors per track, heads and cylinders).

For a partition

- Drive letter assigned to the disk,
- Volume label (if exists),
- Type of the logical disk,
- File system,
- Root entries,

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- Serial number,
- NTFS version,
- Partition ID,
- Total size, used space and free space (in GB), etc.

Besides you can modify practically any partition property by clicking on the required value.

For a block of free space

- Total size (in GB).

Status Bar

This is the bottom part of the main window. The Status Bar displays menu hints, for each item the cursor points to.

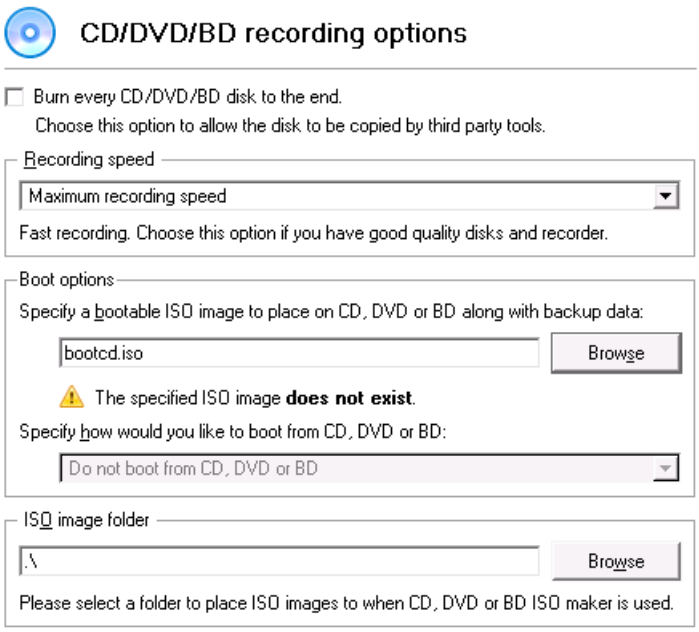
Settings Overview

To call the Settings dialog, please click **Tool Button**, then select **Settings**. All the settings are grouped into several sections, which functions are described in the following paragraphs. The list of sections is placed on the left side of the dialog. By selecting a section from the list, you can open a set of options.

To get a detailed description to any setting, control, or field of the program just click the hint button and then the object you need.

Application Section

CD/DVD/BD recording options



This section contains a set of options that will be taken into account during CD/DVD/BD burn operations:

- **Burn every CD/DVD/BD to the end**. By default, the program does not create ISO 9660 compliant burning sessions, as it processes data on-the-fly and can only estimate the resulted session size. That's why no third party tool will get access to the recorded data. To tackle the issue, mark the checkbox to make the program

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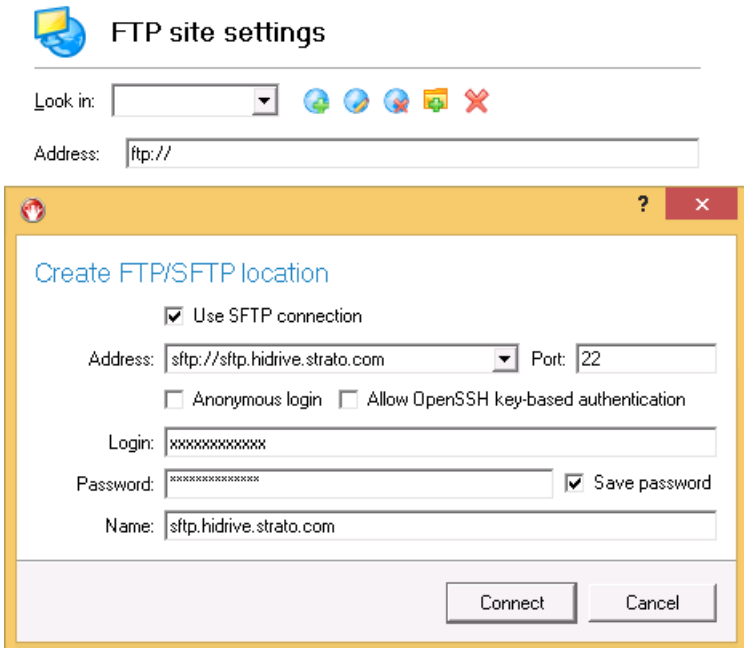
create a standard Disk-at-Once session. It may slow down the burning process, as every CD/DVD/BD will be recorded up to the end, no matter how much actual information to contain.

- **Recording speed**. The user may define how fast a CD/DVD/BD will be recorded (minimum, normal and maximum). Besides there is an automatic mode when the program will set the most appropriate speed for every CD/DVD/BD.
- **Bootable ISO image**. That's the image to be placed together with the backup data. By default, the program offers its own bootable ISO image, which contains a Linux/DOS recovery environment. However, the user is free to use any bootable ISO image.
- **CD/DVD/BD boot capability**. The program enables to choose whether any recorded CD/DVD/BD will be bootable, or only the first one for a session, or without that function at all.
- **Folder where the ISO image is to be placed**. When the user decides not to physically burn a CD/DVD/BD, but create an ISO image file, this very folder will be used to contain these images.

FTP sites options



In this section you can manage online backup storages located on FTP or SFTP servers. By clicking on available buttons, you can create, modify, delete an FTP/SFTP location, etc.

To create an FTP/SFTP location, you've got to specify a number of options:

- **Use SFTP connection**. Mark the option to connect to the desired SFTP server if necessary;
- **Address**. Type in an address to the desired server;
- **Port**. Specify the required port (21 for FPT and 22 for SFTP by default);
- **Anonymous login**. Mark the option to set up anonymous connection. Typical username for this type of login is "anonymous";
- **Use Active Mode** (only for FTP). Mark the option if your provider requires this type of authentication;
- **Allow Open SSH key-based authentication** (only for SFTP). If your provider requires this type of authentication, mark the option to specify public and private keys and a passphrase;

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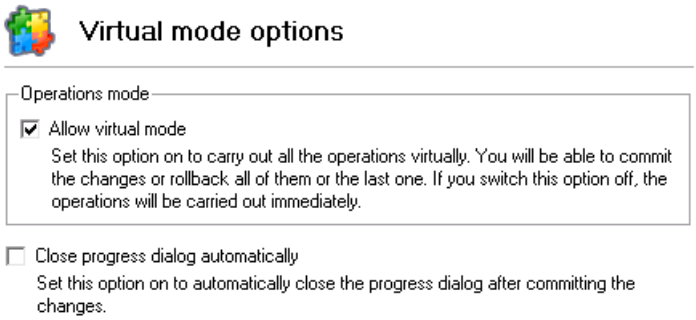
- **Login**. Enter a login;
- **Password**. Enter a password. Click **Remember password** to save it next time you back up to this location;
- **Name**. By default, the program uses the provided address as the connection name, which can be modified however.

You need to check out yourself Windows Firewall or programs of this kind let our program work with the required port (21 for FTP and 22 for SFTP by default).

By clicking the **Connect** button the provided location will be checked. If ok, you'll get a new item on the list named after this location. By clicking the + icon you can browse it to specify a more exact location for your backups.

Virtual mode options



In this section you may configure the virtual mode:

- **Allow virtual mode**. Mark the checkbox to enable the virtual mode. It is an effective way of protection from any troubles, since no operation will be executed until confirmation, thus giving you a second chance to weigh all pros and cons of this or that particular operation.

We strongly recommend you to enable this mode.

- **Close progress dialog automatically**. Mark the checkbox to automatically close the progress dialog after accomplishing operations.

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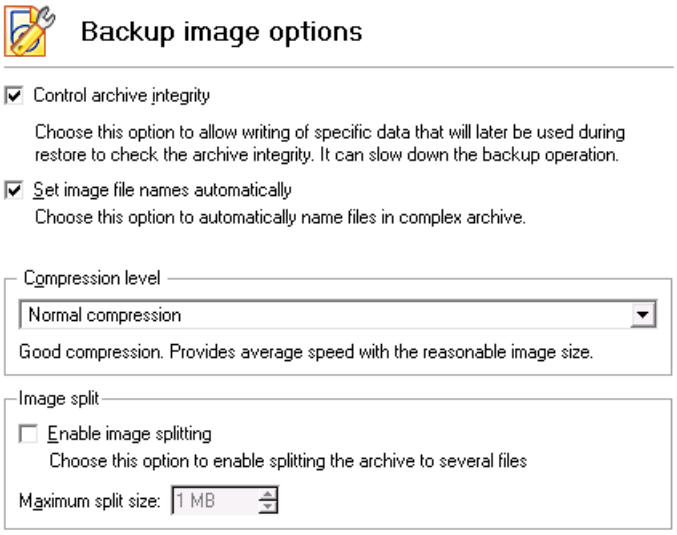
Backup Section

Backup image options



This section contains a set of options that will be taken into account during backup/restore operations:

- **Control archive integrity**. Mark the checkbox to guarantee that all backup images created with the program are 100 percent flawless. If you decided not to control the archive integrity, the backup operation would take about 3-5% less time.
- **Set image file names automatically**. Mark the checkbox to make the program automatically set a file name for every volume of a complex backup image. Otherwise you will need to do it manually during the backup operation.
- **Compression level**. From the pull-down list you can select the desired compression level for backup images that will be used by default.
- **Enable image splitting**. Mark the checkbox to automatically split every backup image to volumes of a particular size.

Splitting images enables to tackle problems caused by a maximum file size limitation of some file systems.

- **Maximum split size**. With the spinner control you can specify a maximum size for backup volumes.

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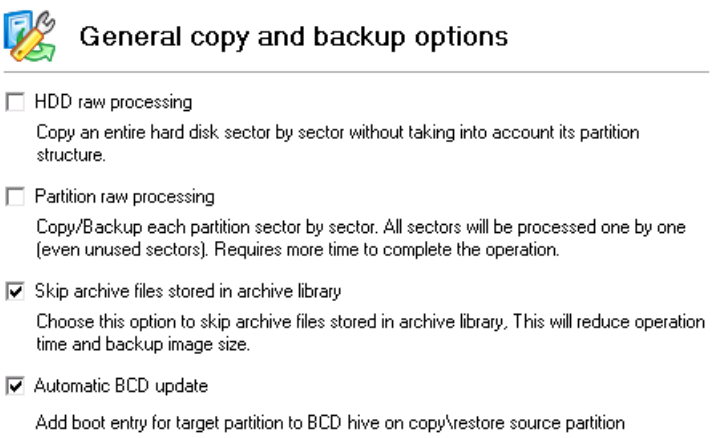
General copy and backup options



This section contains a set of options that will be taken into account during copy and backup operations:

- **HDD raw processing**. Mark the checkbox to copy/back up a hard disk in the sector-by-sector mode, thus ignoring its information structure (e.g. unallocated space or unused sectors of existing partitions will be processed as well). This can help to avoid problems with hidden data created by certain applications or the system administrator. However, it will take more time to accomplish the operation.
- **Partition raw processing**. Mark the checkbox to copy a partition in the sector-by-sector mode to successfully process unknown file systems. However it is not recommended to enable this option when working with supported file systems as it takes more time to accomplish the operation.
- **Skip OS auxiliary files**. Mark the checkbox to skip OS auxiliary files (like pagefile.sys, hiberfil.sys, etc.), thus reducing the operation time and the resulted size of the backup image.
- **Skip archive files stored in archive library**. Mark the checkbox to skip backup images registered in the archive database, thus reducing the operation time and the resulted size of the backup image.
- **Automatic BCD Update**. Unmark the checkbox to suppress automatic update of BCD (Boot Configuration Data) after copy/restore operations.

By clicking the link at the bottom of the window you can jump to the Copy/Backup exclude options.

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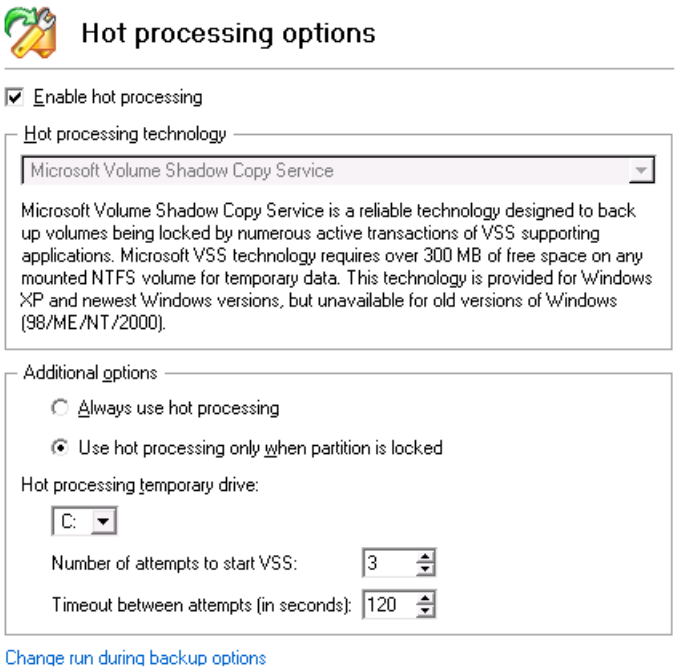
Hot processing options



In this section you may configure the hot processing mode:

- **Enable hot processing**. Mark the checkbox to enable the so called hot data processing mode that is specially designed to process data without restarting your operating system.
- **Hot processing technology**. From the pull-down list you can select the required hot processing technology.
- **Always use hot processing**. Select the option to process partitions without making them locked. Thus you will be able to keep working with them as usual.
- **Use hot processing only when partition is locked**. Select the option to use the hot processing only when partitions are locked and cannot be processed without restarting the computer. Please keep in mind, that once you start any operation on a partition in this mode, it will automatically be locked by the program, thus you won't be able to keep working with it as usual.
- **Hot processing temporary drive**. Here you can select a disk drive that will be used to store the temporary hot backup data (by default – C:).
- **Attempts to start VSS**. Here you can set how many attempts to start Microsoft VSS the program is to do before automatically rebooting the system and accomplishing the operation in a special boot-up mode.
- **Timeout between attempts (in seconds)**. Here you can set a time period between different attempts to start Microsoft VSS.
- **Switch between hot processing technologies**. Mark the checkbox to automatically switch between Paragon Hot Processing and Microsoft VSS if one of them is unavailable at the moment.

By clicking the link at the bottom of the window you can jump to the Run during backup options.

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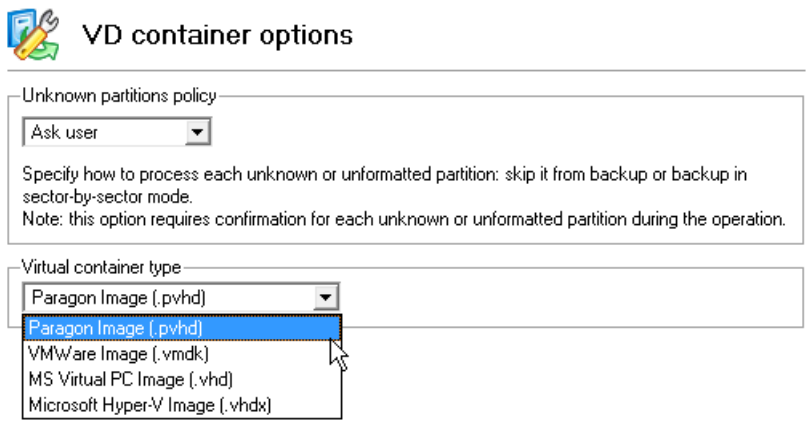
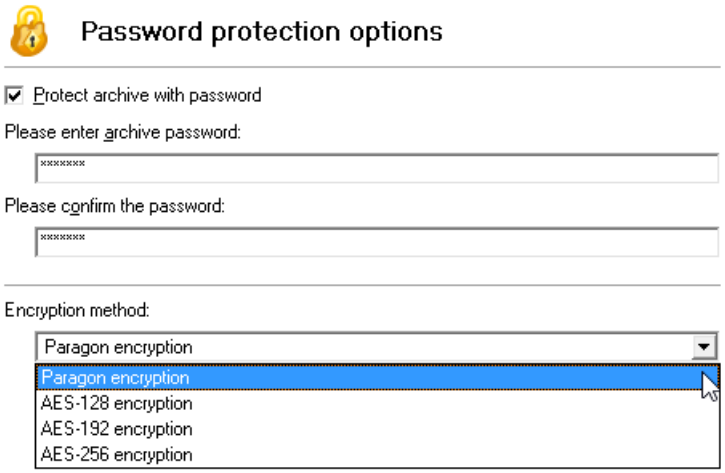
VD container options



This section contains options that will be taken into account when creating virtual containers:

- **Unknown partitions policy**. Here you can define behavior for processing unknown or unformatted partitions (skip from backup, process in the sector-by-sector mode, or ask the user each time this type of partition has been found).
- **Virtual container type**. By default the program is configured to back up to pVHD (Paragon Virtual Hard Drive). Use this option to switch the resulted virtual container to VHD, VHDX, or VMDK. Please note that the use of pVHD enables to get full backup images several times smaller than the original objects, while incremental updates – dozens of times smaller when comparing to VHD, VHDX or VMDK, which have some fixed size of blocks, not dynamic. Besides encryption and password protection are only available for pVHD. However, if you're having a VMware or Microsoft hypervisor at your disposal and are planning to do instant virtualization, please make sure the used backup format matches your hypervisor.

Password protection options



In this section, you can create encrypted and protected archive to prevent unauthorized access to your personal data:

- **Protect archive with password.** By default, all created archives will be protected with password. If you do not want create an archive password, please unmark this option.
- **Encrypted method.** By default, all created archives will be protected with the Paragon's encryption algorithm, but you can choose Advanced Encryption Standard (AES) with various key length (128, 192 and 256 bits) instead.

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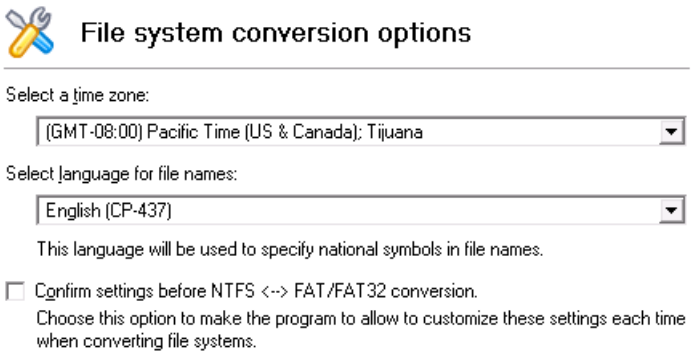
Partitioning Section

File system conversion options



This section contains a set of options that will be taken into account when converting FAT and NTFS file systems. By default, the program takes locale (regional) settings from the system. Problems might occur however because of different standards for file names and file time stamps (Created, Modified and Last Access Time) of NTFS and FATxx file systems.

To tackle problems of that kind you can manually set:

- **Time zone** to use during the convert operation. NTFS keeps file timestamps in GMT (Greenwich Mean Time) while FAT uses a fixed local date and time. The program takes proper account of these differences and enables to adjust timestamp values.

An incorrectly chosen time zone might lead to inability to launch certain software.

- **Language for file names** to use during the convert operation. NTFS stores file names in Unicode while FAT/FAT32 uses ANSI to save short file names (also called the DOS aliases). The codepage information is required for the correct conversion of non-English file names from Unicode to ANSI and vice versa.

An incorrectly chosen codepage will certainly result in corruption of non-English file names.

- **Request confirmation of settings before NTFS < - > FAT/FAT32 conversion**. Mark the checkbox to automatically display the local settings dialog to check and modify (if necessary) the default parameters before launching the convert file system operation.

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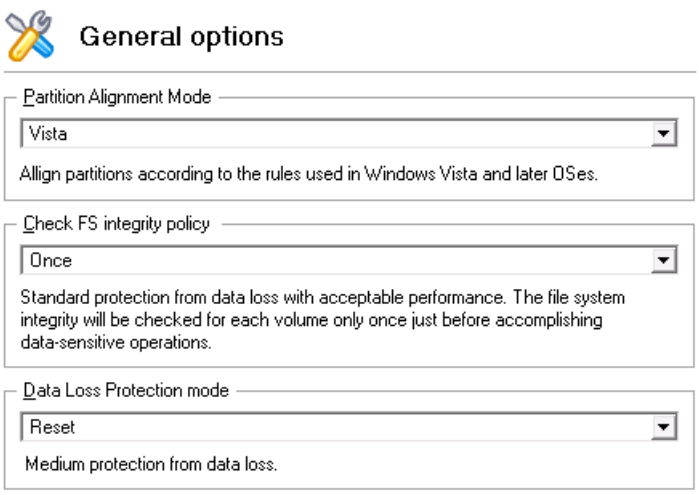
General options



This section contains a set of general options that will be taken into account during any operation carried out with the program:

- **Partition Alignment mode**. There are three options you can choose from:
  - **Legacy**. DOS and Windows OSes before Vista required that partitions had to be aligned to the “disk cylinder” or 63 sectors to address and access sectors correctly. It was OK, until 4K hard drives came into scene. When partitions are aligned this way on this type of disk, each logical cluster is linked to two physical 4K clusters, thus resulting in a double read-write operation.
  - **Vista**. Since Windows Vista, operating systems do not use the archaic CHS (cylinder/head/sector) addressing scheme, but the Logical Block Addressing (LBA), where sectors are addressed continuously over the whole disk drive. It is optimal for both, 512B and new 4K disk drivers.
  - **Inheritance**. Select the option to disable automatic alignment of partitions.
- **Check FS integrity policy**. Accomplishment of any data-sensitive operation (resize, move, merge, redistribute, etc.) is potential with data loss. To minimize this risk, it’s recommended to check integrity of your file system before this type of operations, despite the fact that it’s quite time consuming. We offer you several options to let you choose, which is best for you:
  - **Always**. Maximum protection, but minimal performance. The file system integrity will be checked each time it’s necessary to guarantee the maximum protection for the on-disk data.
  - **Once**. Standard protection with acceptable performance. The file system integrity will be checked for each volume only once just before accomplishing data-sensitive operations.
  - **Never**. No protection, but maximum performance. If you’re not 100% sure your disk is rock solid, please do not use this option.
- **Data Loss Protection mode**. To guarantee safety for your information when a data-sensitive operation has been abruptly interrupted as a result of a computer reset, or a power outage, there are several techniques, that correspond to the options below:
  - **Do not protect**. No protection, but maximum performance. If you’re not 100% sure you’re completely safe from a power outage, or an accidental reset of your computer, please do not use this option.
  - **Reset**. Standard protection with acceptable performance. Maintaining a special journal, our program enables to automatically complete a data-sensitive operation interrupted by an accidental reset of your computer from our bootable recovery media, thus reviving the corrupted partition.

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- **Power loss**. Maximum protection, but minimal performance. Besides journaling, our program will also disable cache of your disk when accomplishing data-sensitive operations to avoid data loss even in case of a power outage.

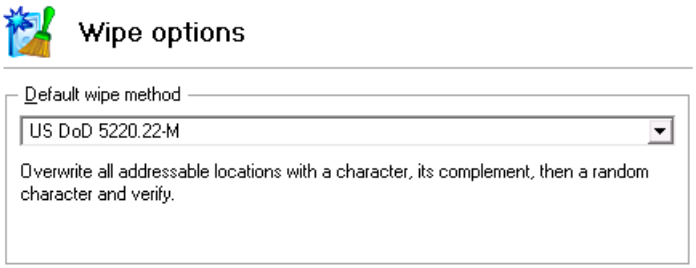
Partitioning options

This section contains a set of options that will be taken into account during partitioning operations:

- **Request confirmation before partition deletion**. Mark the checkbox to activate an additional security mechanism. Thus when going to delete a partition you will be automatically requested to enter its label.
- **Request confirmation when converting FAT16 to FAT32**. Mark the checkbox to automatically request confirmation before converting FAT16 to FAT32. There are a number of situations when this kind of conversion is the only way out to accomplish the operation. For instance, you are going to migrate your system to a larger hard disk with the proportional resize of existing partitions, what is very convenient. As a result you can get original FAT16 partitions go beyond the 4GB limit. Thus without conversion to FAT32, this operation will in no way be possible to accomplish. The same goes for any copy hard disk/partition or restore hard disk/partition operation involving an extra upsizing.

Wipe Section

Wipe options



Here you can set a specific data erasure algorithm that will be used by default during wipe operations.

The list of supported military and government standards may vary for your product.

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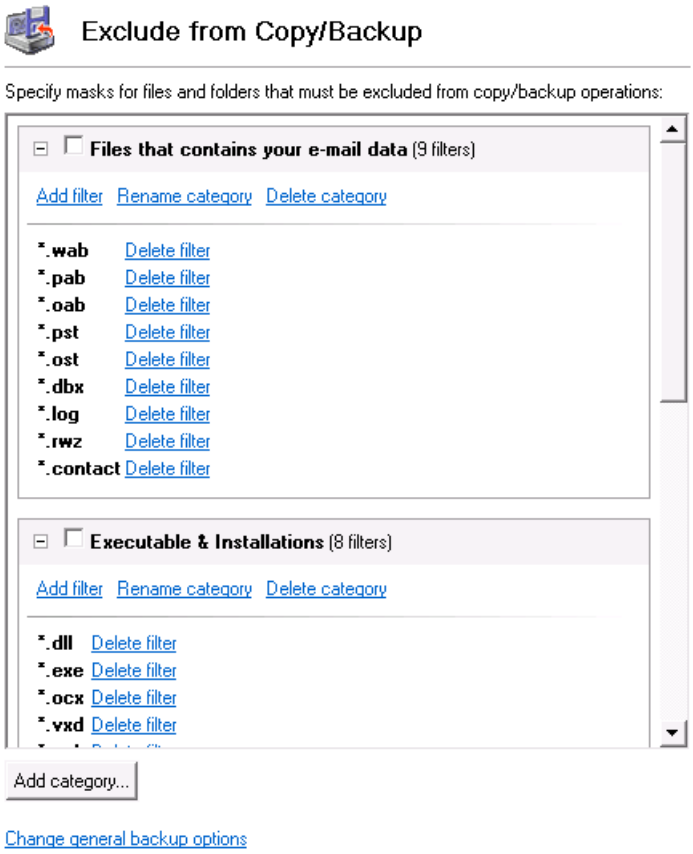
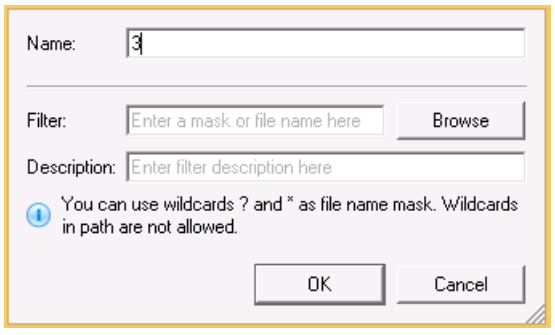
Include/Exclude Section

Copy/Backup exclude options



In this section the program enables to specify what data should be automatically ignored during copy and sector-based backup operations. You can filter certain files or folders either by the manual selection or by creating masks, what is more preferable. Thus you will be able to effectively manage contents of your backup images or partition/hard disk copies.

By default, there are no available filters. To create a filter, please click the Add Category… button.



In the opened dialog the program allows the user to define the following parameters:

- **Name**. Give to the filter any name you like, but try to use an informative one;
- **Filter**. Press the Browse button to select files or folders you would like to be excluded or specify a filter mask by using * or ? wildcards;
- **Description**. Add a short description to the filter not to miss it up later.

Click the OK button and you will get a new item on the list of filters. By marking/unmarking a checkbox opposite its name you can choose whether to use it or not.

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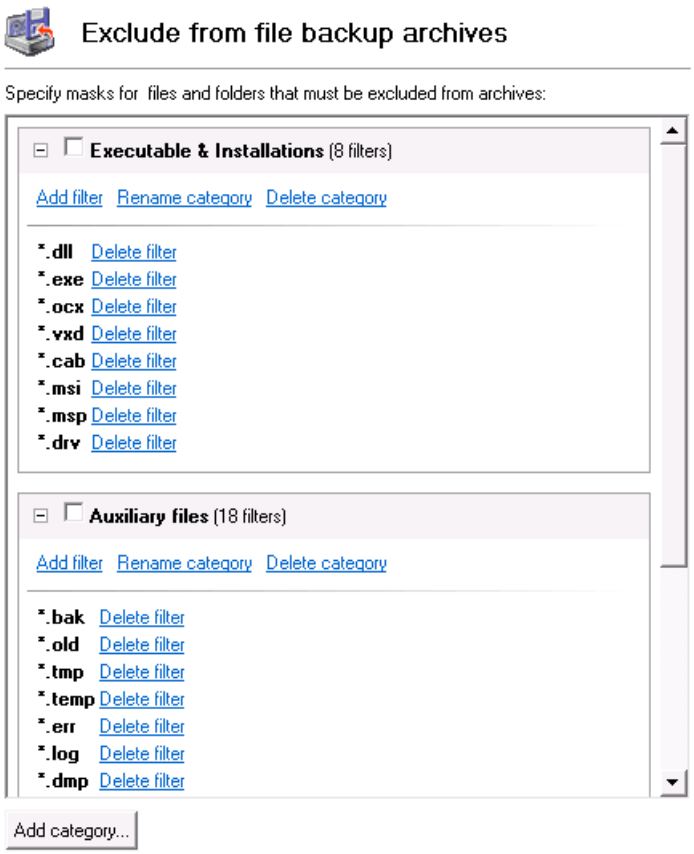
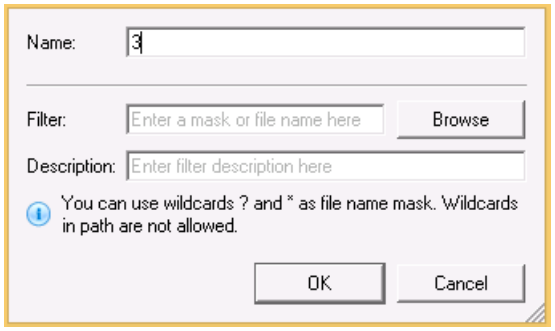
By clicking the link at the bottom of the window you can jump to the General copy and backup options.

File backup exclude options



In this section you can find a lot of ready-made exclude filters to effectively control contents of your file-based backup images. Please note, by selecting certain filters you specify what data will be ignored during file-based backup operations, thus you specify the data you'd like not to be added to the resulted archives.

Anyway you've got the option to create your own filter by clicking the Add category… button.



In the opened dialog the program allows the user to define the following parameters:

- **Name**. Give to the filter any name you like, but try to use an informative one;
- **Filter**. Press the Browse button to select files or folders you would like to be excluded or specify a filter mask by using * or ? wildcards;
- **Description**. Add a short description to the filter not to miss it up later.

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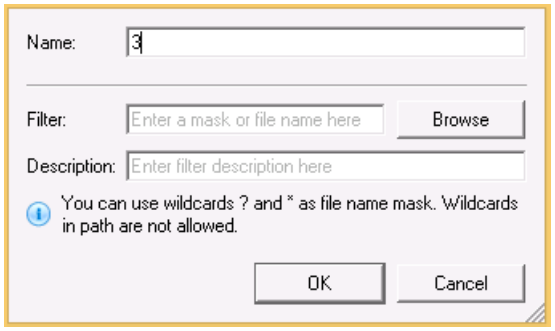
Click the OK button and you will get a new item on the list of filters. By marking/unmarking a checkbox opposite its name you can choose whether to use it or not.

File backup include options

In this section you can find a lot of ready-made include filters to effectively control contents of your file-based backup images. Please note, by selecting certain filters you specify what data will be processed during file-based backup operations, thus you automatically ignore files that do not match, so they won't be added to the resulted archives.

Anyway you've got the option to create your own filter by clicking the Add category… button.



In the opened dialog the program allows the user to define the following parameters:

- **Name**. Give to the filter any name you like, but try to use an informative one;
- **Filter**. Press the Browse button to select files or folders you would like to be excluded or specify a filter mask by using * or ? wildcards;
- **Description**. Add a short description to the filter not to miss it up later.

Click the OK button and you will get a new item on the list of filters. By marking/unmarking a checkbox opposite its name you can choose whether to use it or not.

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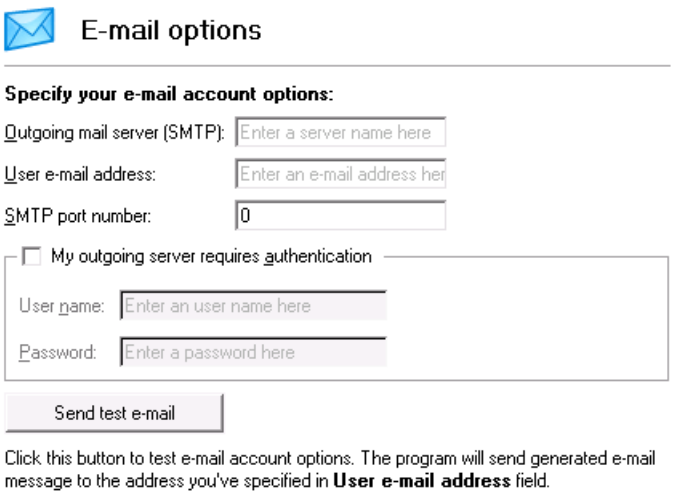
E-mail Notifications and Logging Section

E-Mail options



This section contains a set of options that will be taken into account during the Send log files and Send e-mail notification operations:

- **Outgoing mail server (SMTP)**. To send messages by using the built-in mail client, it is necessary to have access to a computer running an SMTP (Simple Mail Transfer Protocol) server. All outgoing messages are first sent to the SMTP server, which in its turn delivers them to the required recipients. The address may be represented as a traditional Internet host name (e.g.: mail.com) or as an IP numeric address (e.g. xxx.xxx.xxx.xx).
- **User e-mail address**. Specify an e-mail address that has been assigned by the Internet Service Provider or organization's e-mail administrator.
- **My outgoing server requires authentication**. Activate the option to allow the program to make authentication on the server before sending messages.

  - User name. Enter the name that will be used to log in to the e-mail account.

  - Password. Enter the password that will be used to access the mail server.

When you're ready with the settings, click on the **Send test e-mail** button to check if everything is OK.

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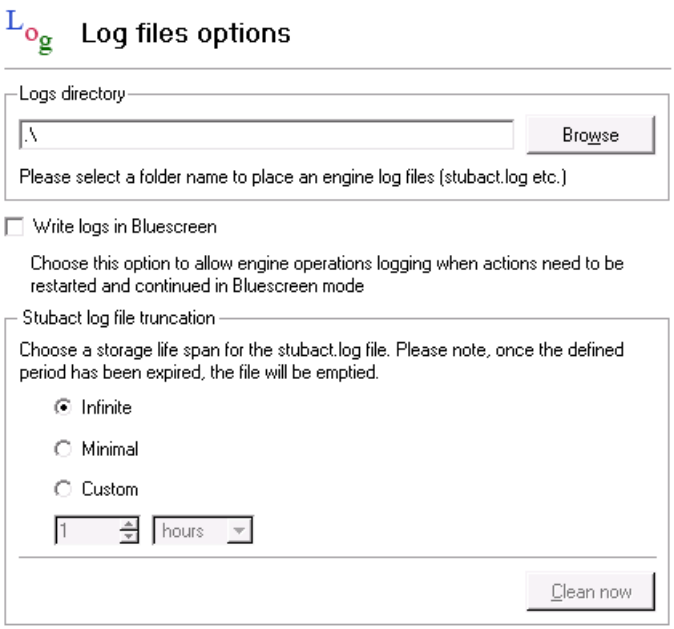
Log files options



In this section you can set up the program logging engine:

- **Logs directory** to specify location of program log files. By default, all logs are placed to: **C:\Program Files\Paragon Software\product's name\program**
- **Write logs in Bluescreen** to enable the program logging in a special boot-up mode
- **Stubact log file truncation** to specify a storage life span for the stubact.log file:
  - **Infinite** not to empty the file ever;
  - **Minimal** to have the file emptied all the time;
  - **Custom** to set a certain storage life span for the file. Please note, once the defined period has been expired, the file will be emptied.

We strongly recommend you not to choose the Minimal option, as in case of having problems with the program, our Support Team won't be able to study operation logs, thus help you out.

Viewing Disk Properties

The Disk Map and the Disk and Partitions List are the main tools to get information on the properties of hard disks and partitions available in the system. To know more on the subject, please consult the corresponding chapters of the Interface Overview chapter.

Viewing Image Properties

General information on backup archives can be obtained with the following tools:

Using the Restore Wizard

- Click the **Backup & Restore** tab on the Ribbon Panel, then select **Restore**.

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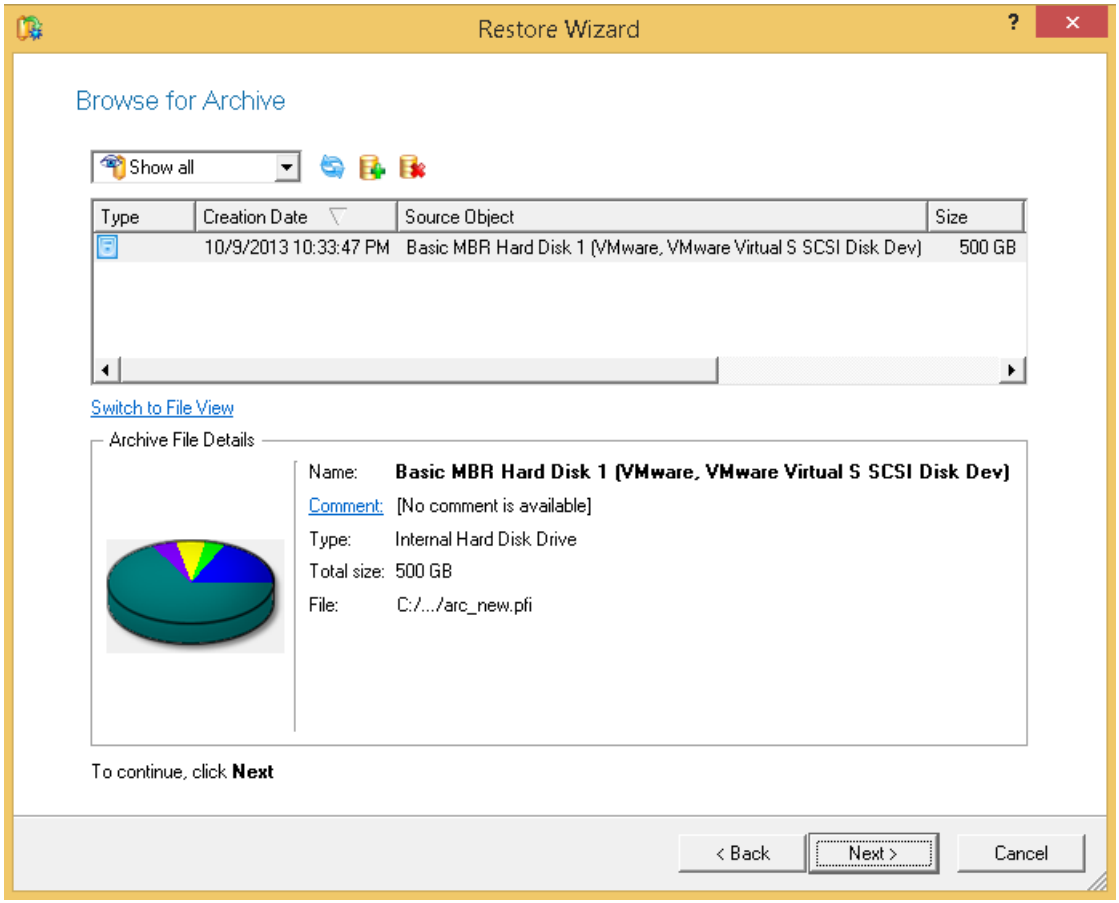
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

At first, the wizard displays the Welcome page – simply click the Next button at the foot of the dialog window.

The next page refers to Browse for Archive. By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).



To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description, including:

- Information on a type of the archive contents (whether it is sector-based or file-based),
- Whether the archive is compressed or not,
- Whether the archive is password protected or not,
- The date, when the archive was created.

In addition, there are some special graphical flags to indicate crucial properties:

FLAG	FUNCTIONALITY
	Disk archive
	Partition archive
	File archive
	MBR archive

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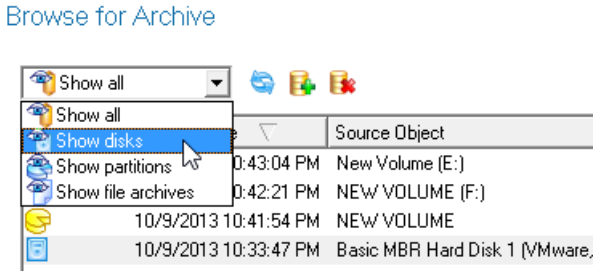
	System archive
	Encrypted archive
	Compressed archive
	Complex archive
	Filtered archive
	Differential archive
	Incremental archive
	File increment to a partition archive

To easily manage images in the Archive Database, the program provides the following functionality:

BUTTON	FUNCTIONALITY
	Refresh the contents of the database
	Show only existing archives
	Add the selected archive to the database
	Delete the selected archive from the database

Besides you may filter backup archives to decide whether to show only file, partition or hard disk archives. To do that, please select the required filter in the left top corner of the page.



By clicking the **Switch to File View** link, you can find the required image in the browser-like window.

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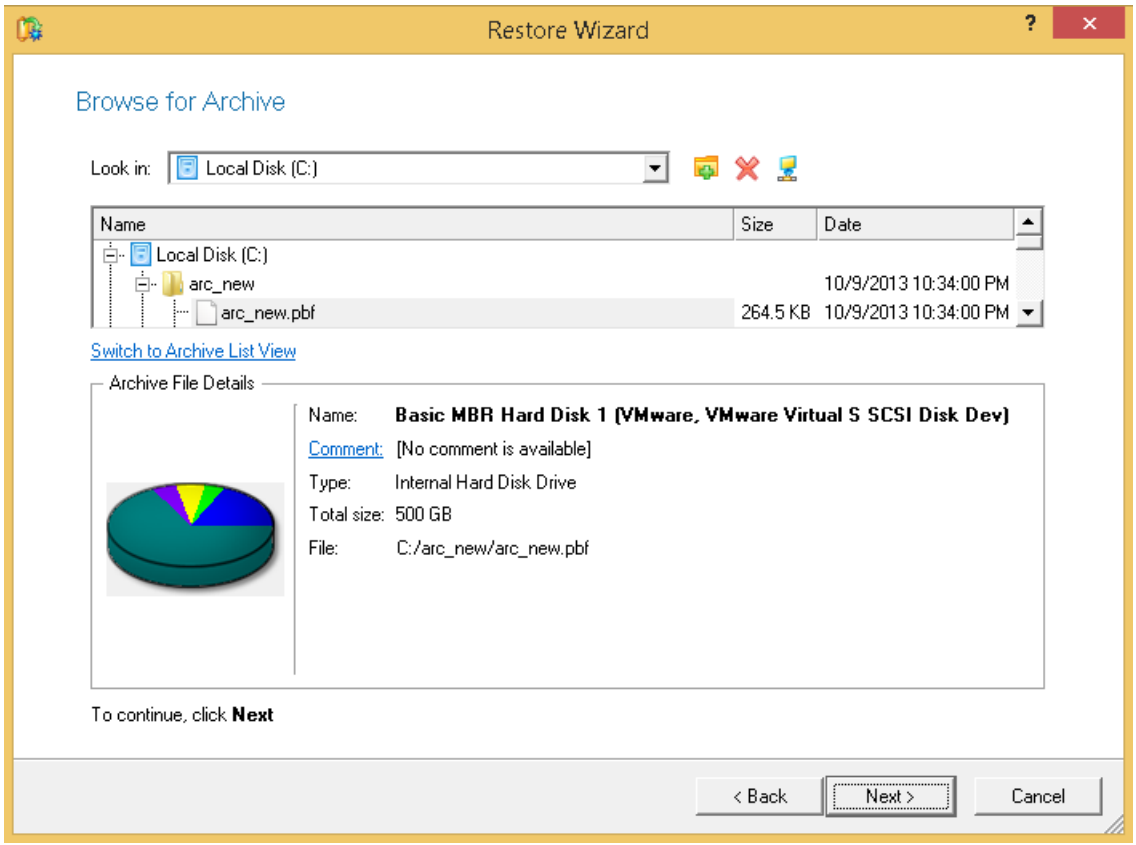

The section below (i.e. Archive File Details) displays a short description of the selected image, including:

- Information on a type of the archive contents (whether it is sector-based or file-based),
- Whether the archive is compressed or not,
- Whether the archive is password protected or not,
- The date, when the archive was created.

Moreover, on this page you've got the possibility to create new folders, delete existing files/folders or map network drives by clicking the appropriate buttons.

The next page (i.e. What to restore) displays detailed information about the contents of the archive.

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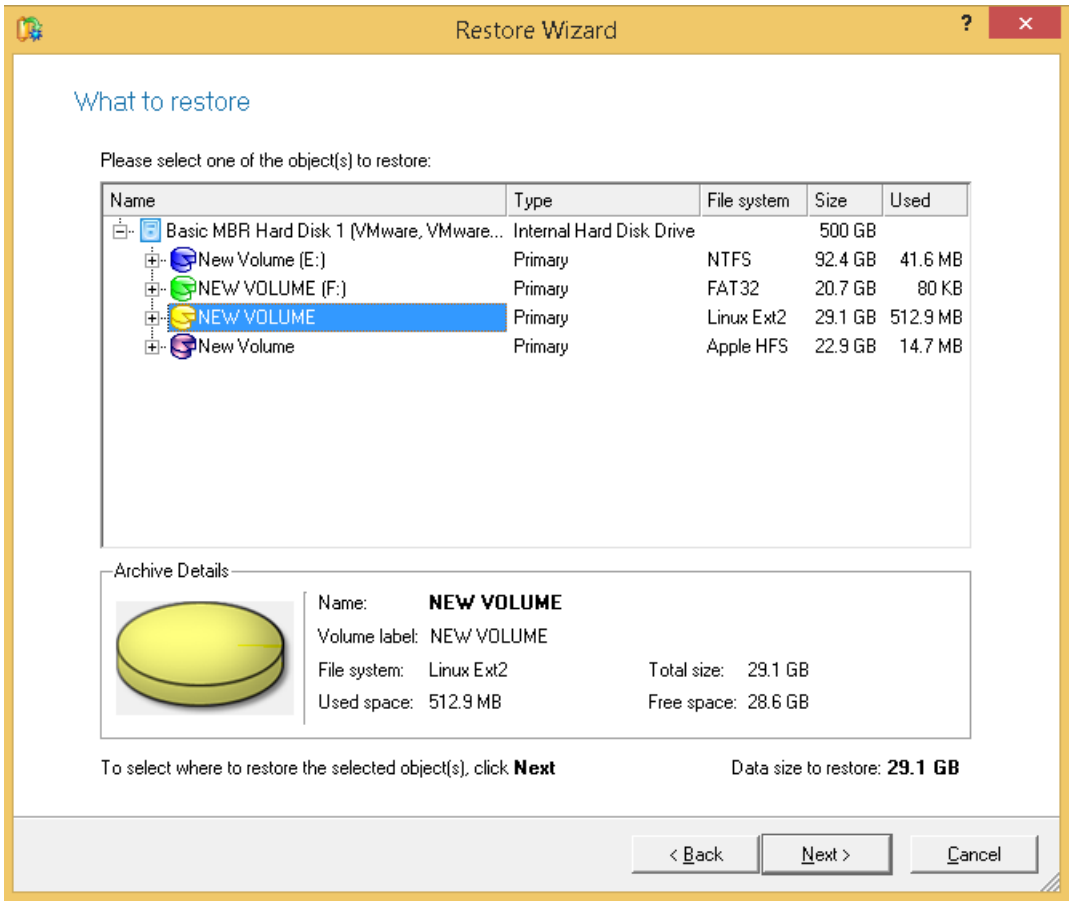

If you want to restore the image contents, click the Next button. In order to cancel, click the Cancel button.

Using the Archive Database

To open the Archive Database, click the **Archives** tab on the Ribbon Panel. The database window can be conditionally subdivided into several sections that differ in their purpose and functionality:

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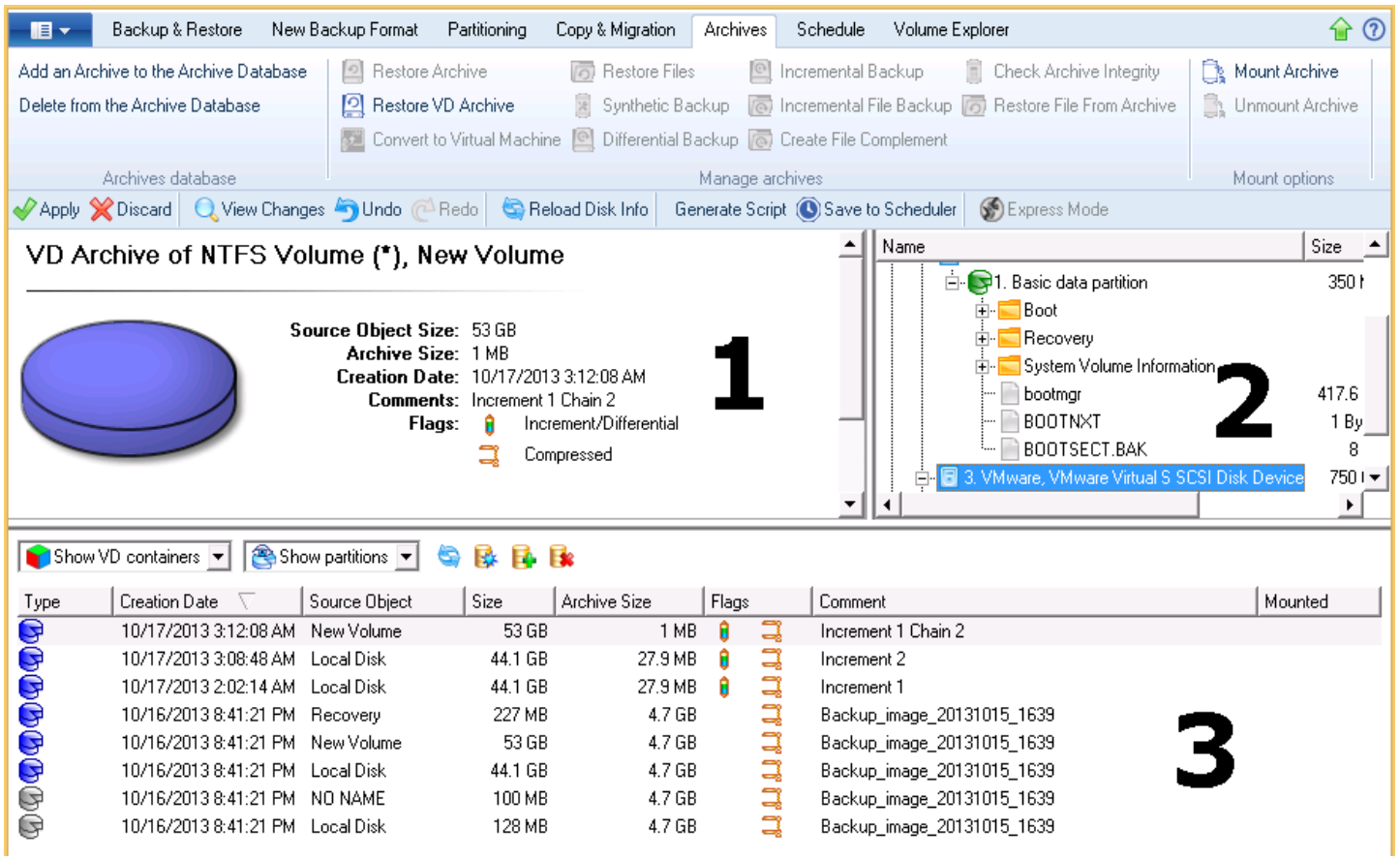

1. **Properties Panel** that displays properties of the selected image.

2. Volume Explorer that enables to access the selected image as a regular folder to explorer its contents or to retrieve certain files.

3. **Archive List** that displays a list of images contained in the Archive Database (if any). Besides the program provides all the necessary functionality to manage backup images in the database (add, delete, mount, refresh, etc.).

All panels offer a synchronized layout and are separated by vertical and horizontal expandable sliders, allowing the user to customize the screen layout.

Data Backup and Rescue

In this chapter you will find all the information necessary to establish a reliable data protection system.

Creating Backup Images

Depending on a type of information you need to protect and the way this information should be processed, the program offers a number of handy backup wizards. To make your job with the program as easy and convenient as possible, all backup wizards share similar work algorithm. By going through steps of the wizard, you configure all the necessary settings to launch the backup operation. To minimize the possibility of making any mistake, the wizard provides auxiliary information on every single option. Moreover you can get an in-depth description to any setting, control, or field of the wizard just by clicking the hint button and then the object you need.

Smart Backup Wizard Startup

- Click the **Backup & Restore** tab on the Ribbon Panel, then select **Smart Backup**.

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There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Smart Backup Wizard Setup

The wizard offers the following steps to accomplish the backup operation:

- **The object to back up**. Click on a section you find answering to your task.

- **Disk or Partitions** to create a sector-based backup of the whole disk system, or only separate partitions;

- **E-mail** to create a file-based backup of e-mail databases, accounts and address books of MS Outlook, MS Express, and Windows Mail;

- **Media Files** to create a file-based backup of all media files (photo, video, music, etc) stored in the My Documents folder;

- **Documents** to create a file-based backup of all office documents stored in the My Documents folder;

- **Other Files and Folders** to create a file-based backup of any files and folders.

If selecting Disk or Partitions or Other Files and Folders you will need to specify more exactly the object of operation. To know more on the subject, please consult the Backup Scenarios chapter.

- **Name and location of the resulted image**. Provide a file name for the new image and its exact location. The program automatically offers an easy to understand name containing the date and the time of the archive creation, which can anyway be modified.

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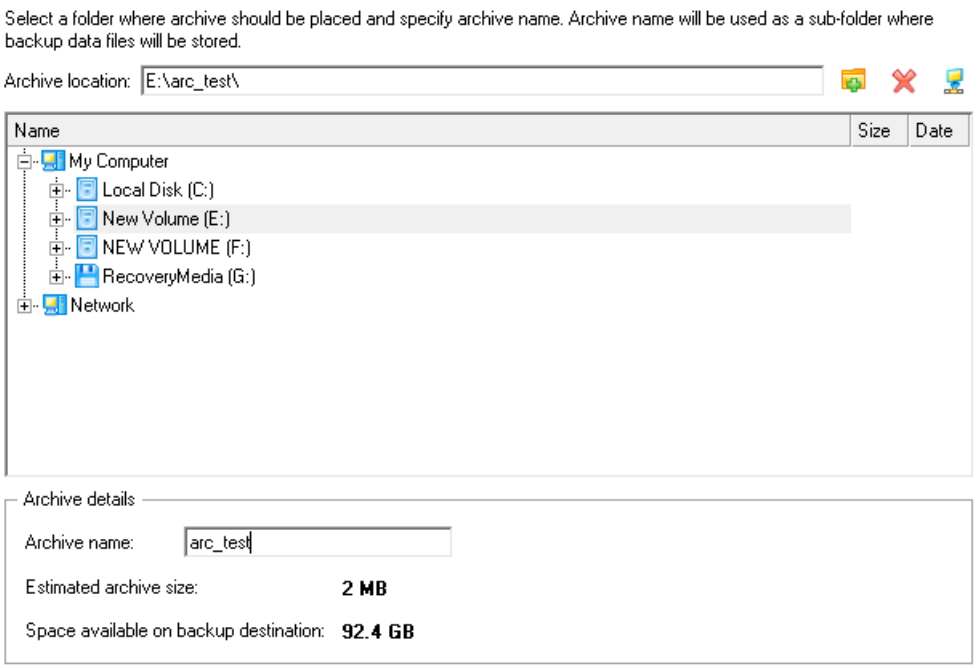
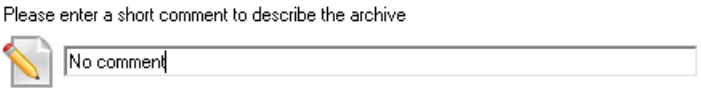


The program automatically calculates size of the future archive and informs the user about space available on the selected destination.

- **Archive Comment**. You can add some additional description to the archive that will later help to distinguish it from the others.



Result

After the backup operation is completed you receive an image of the selected object. This image is placed into the specified destination, its features defined by the wizard.

Available operation scenarios:

- Backing up a hard disk or partition to the Backup Capsule
- Backing up a hard disk or partition to external media (CD/DVD)
- Backing up a hard disk or partition to a network drive
- Backing up files to an FTP/SFTP server
- Backing up a dual boot Mac to an external USB drive
- Backing up files to a local mounted/unmounted (without drive letter assigned) partition
- Creating a differential to a full partition backup
- Creating a file increment to a full partition backup
- Creating an increment to a full file backup
- Merging a full partition backup with one of its differentials

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Restoring System and Data

The program includes a convenient and reliable restore wizard. With its help you can restore all types of backup images created with the program. It provides easy to understand instructions to configure and perform all the necessary settings. Moreover you can get an in-depth description to any setting, control, or field of the wizard just by clicking the hint button and then the object you need.

Startup

- Click the **Backup & Restore** tab on the Ribbon Panel, then select **Restore**.

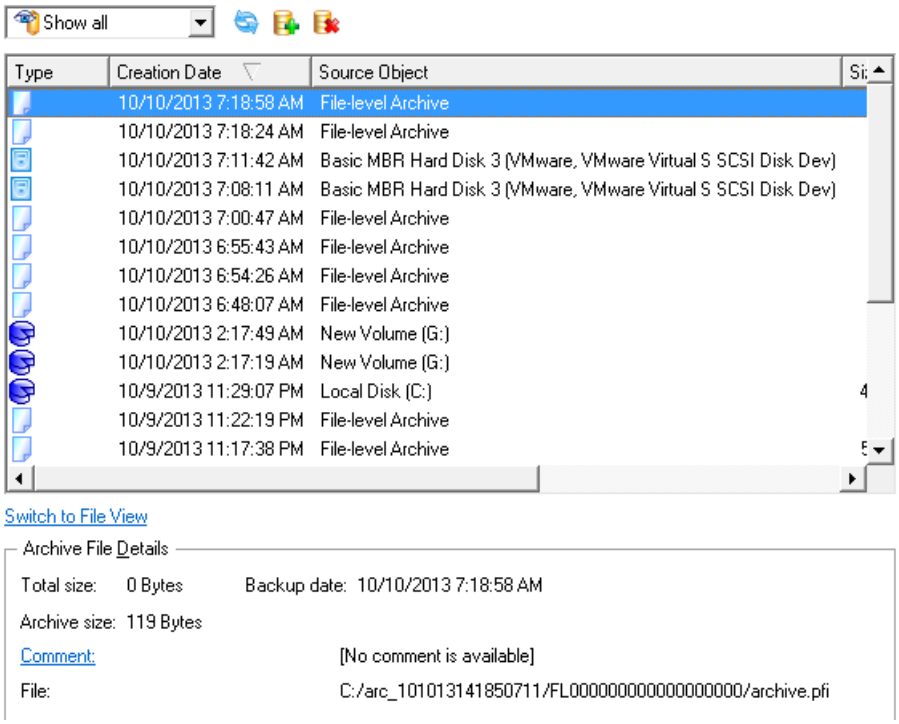
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Setup

The wizard offers the following steps to accomplish the restore operation:

- **A backup image to be restored**. The Browse for Archive page enables to find a backup image you need.

  By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).



  To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

  By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.

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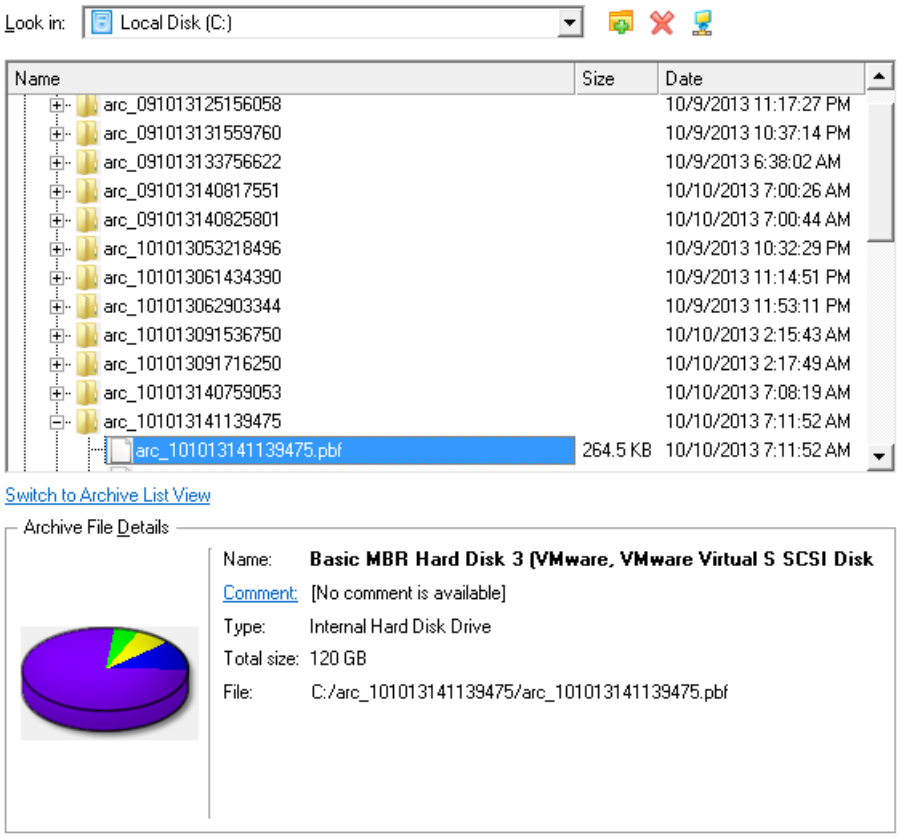

Moreover, on this page you've got the possibility to create new folders, delete existing files/folders or map network drives by clicking the appropriate buttons.

To know more on the subject, please consult the Viewing Image Properties chapter.

File Backup Restore

- **Data to restore**. You've got the option to restore not only the entire archive, but separate items of it (the so called selective restore functionality) by marking checkboxes next to the data items you need.

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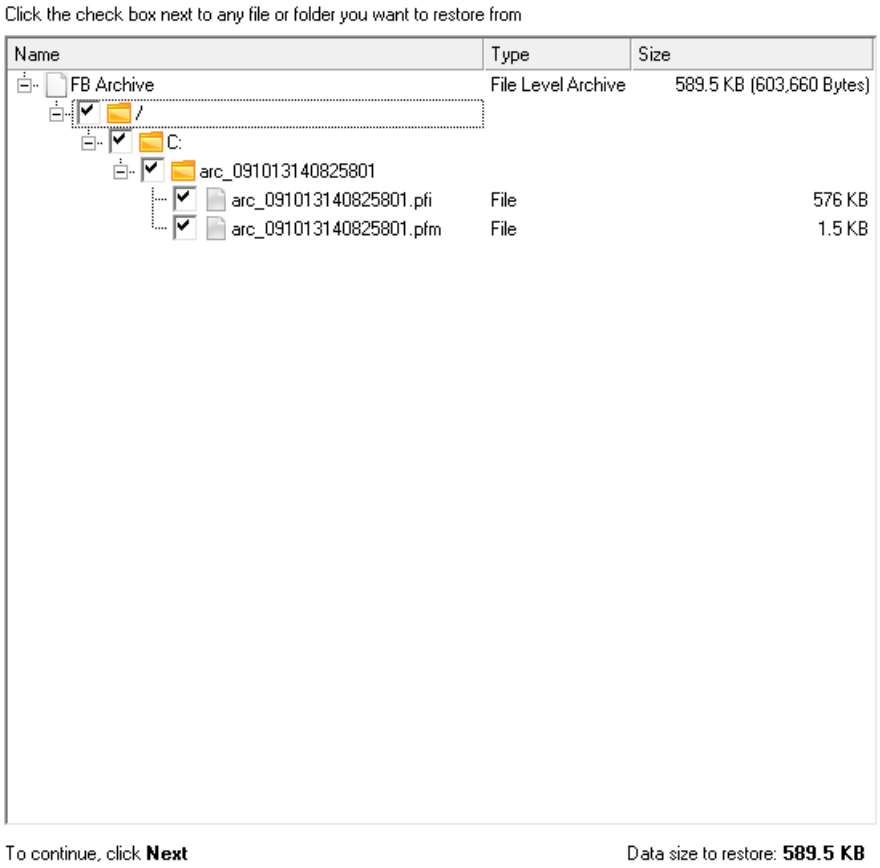
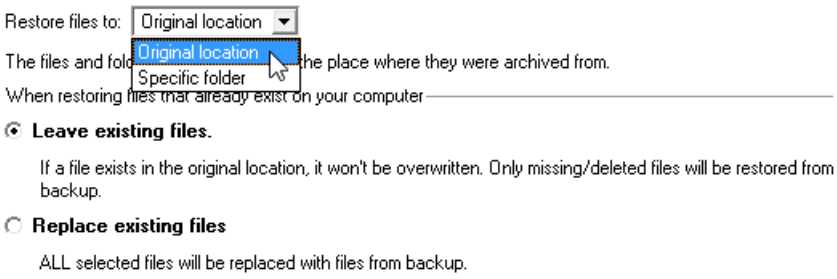


- **A place to restore**. From the pull-down list you can choose whether to restore contents of the backup image to its original location or specify some other one.



Besides if you select the Original location option, you can additionally define whether to replace already existing files during the restore operation (good for recovering presumably corrupted files) or leave them intact (good for recovering accidentally deleted files).

Sector Backup Restore

- **Data to restore.** You've got the option to restore not only the entire archive, but separate items of it (the so called selective restore functionality) by marking checkboxes next to the data items you need.

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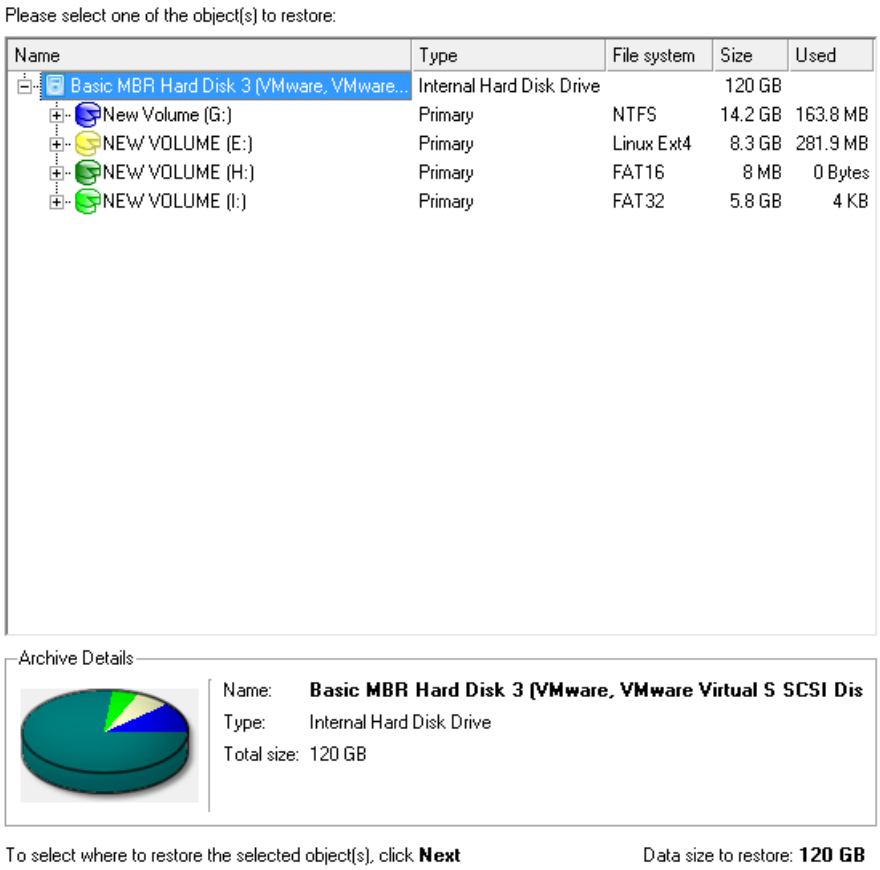
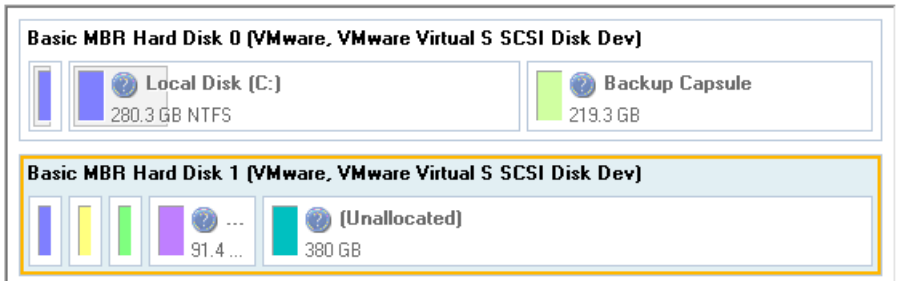


If you select separate files or folders to restore, the wizard will continue working as though you've got to do with a file backup.

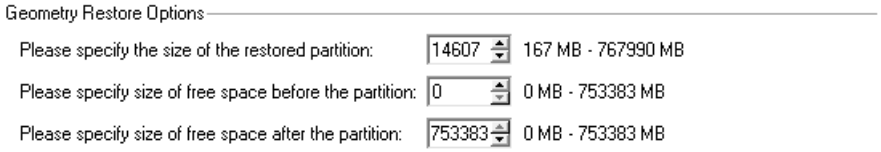
- **A place to restore**. Selecting the destination, please note - all contents on the disk selected for restoring purposes will be deleted during the operation.



To help you get a clear-cut picture of the operation outcome, the program allows inspecting the resulted disk layout.

Restoring Partition:

- **Size of the restored volume and free space before and after it on the disk.**



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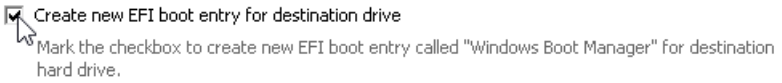
- **Drive letter assignment after restore**. The pull-down list contains vacant drive letters that can be associated with the restored partition.

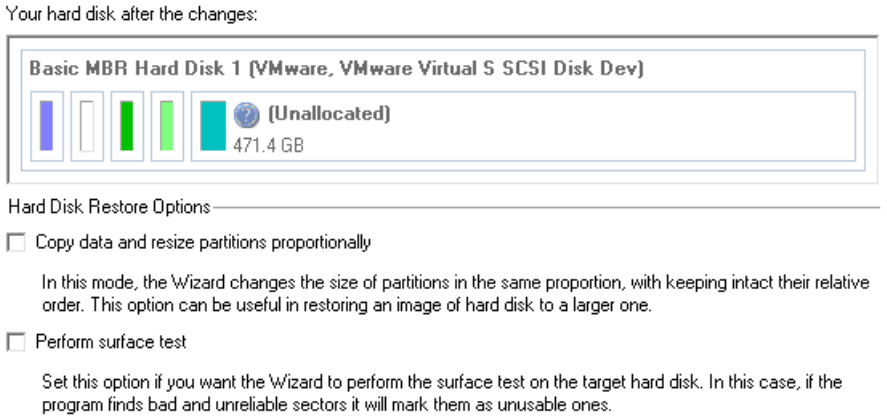
- **Create new EFI boot entry for destination drive**. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the following option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through Boot Corrector.



The option above will be available to the user only if the target disk becomes Bootable GPT as a result of the migration process.

Restoring Hard Disk:

All contents on the disk selected for restoring purposes will be deleted during the operation.



- **Copy data and resize partitions proportionally**. If this option is activated, the program proportionally changes the size of partitions keeping their relative order intact. The option can be useful when restoring to a larger hard disk.
- **Perform surface test**. Define whether the surface test will be accomplished during the operation or not.
- **Create new EFI boot entry for destination drive**. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the following option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through Boot Corrector.

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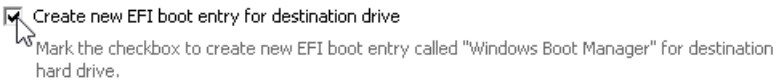

The option above will be available to the user only if the target disk becomes Bootable GPT as a result of the migration process.

Result

The wizard will restore the archived data, and make it available to use in the operating system.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

Available operation scenarios:

- Restoring a hard disk from the bootable Backup Capsule
- Restoring a system partition from external media (CD/DVD)
- Restoring a system partition from a network drive
- Restoring a system partition from a local drive
- Restoring a dual boot Mac from an external USB drive
- Restoring a file increment
- Restoring a file increment to a partition backup
- Restoring separate files and folders from a backup

Copy Tasks

In this chapter you will find all the information necessary to make a copy of a hard disk or a separate partition.

Cloning Hard Disks

You can clone a hard disk of any file system. During the hard disk copying process, the program moves controlling records of used partitioning scheme, the bootstrap code and on-disk partitions. That's why this operation cannot be substituted by simply copying all on-disk partitions.

Copy Hard Disk Wizard

The Copy Hard Disk Wizard is a traditional-like wizard. By going through its steps, you configure all the necessary settings to launch the copy operation. To minimize the possibility of making any mistake, the wizard provides auxiliary information on every single option. Moreover you can get an in-depth description to any setting, control, or field of the wizard just by clicking the hint button and then the object you need.

You need at least two hard disks to carry out this operation.

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Startup

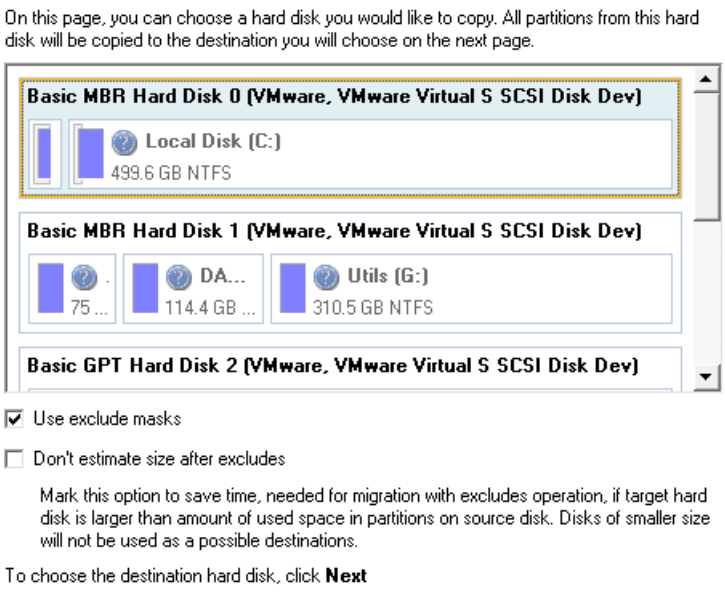
- Click the **Copy & Migration** tab on the Ribbon Panel, then select **Copy Hard Disk**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Setup

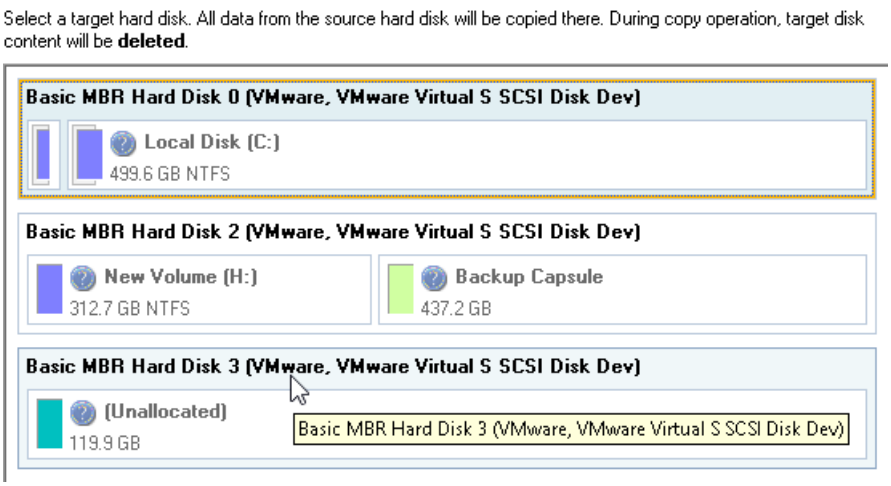
The wizard offers the following steps to accomplish the copy hard disk operation:

- **The hard disk to copy**. Select a hard disk you want to copy.



  - **Use exclude masks**. By default the program doesn't take into account exclude filters set in the Settings dialog. If you need to use them, please mark the checkbox and see existing/specify additional filters on the next page of the wizard.
  - **Don't estimate size after excludes**. You can save time by suppressing calculation of the resulted amount of data to copy after using excludes. Please note however, if you use this option, drives that smaller in size than the source disk will be unavailable to use as destination.

- **The target hard disk**. Select a hard disk (if several) where all data of the source disk will be copied to.



- **Copy parameters**. The wizard enables to specify the following options:

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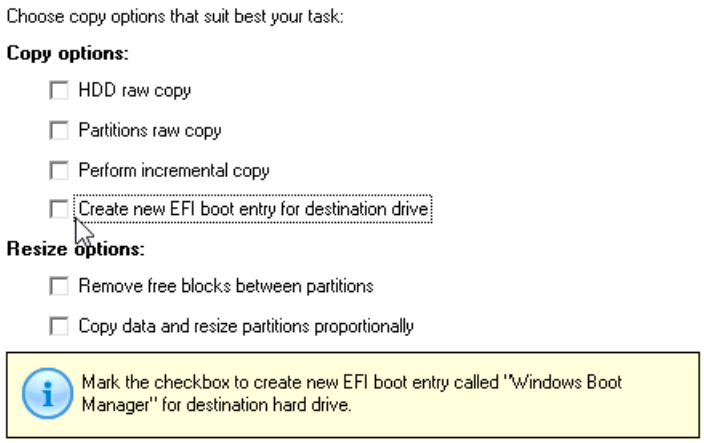

Copy options

- **HDD raw copy** to copy the hard disk in the sector-by-sector mode, thus ignoring its information structure (e.g. unallocated space or unused sectors of existing partitions will be processed as well). This can help to avoid problems with hidden data created by certain applications or the system administrator. However, it will take more time to accomplish the operation.

- **Partition raw copy** to copy the on-disk partitions in the sector-by-sector mode to successfully process unknown file systems. However it is not recommended to enable this option when working with supported file systems as it takes more time to accomplish the operation.

- **Create new EFI boot entry for destination drive**. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the following option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through Boot Corrector.

The option above will be available to the user only if the target disk becomes Bootable GPT as a result of the migration process.

Resize options

- **Remove free blocks between partitions** not to keep blocks of free space between partitions on the targeted hard disk.

- **Copy data and resize partitions proportionally** to make the program proportionally change the size of partitions keeping their relative order intact. The option can be useful when upgrading the hard disk to a larger one.

Result

After the operation is completed, you receive a fully functional duplicate of the existing hard disk.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

Available operation scenarios:

- Migrating system to a new HDD (up to 2.2TB in size)

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Cloning Partitions

You can duplicate partitions to protect oneself from downtime in case of a system malfunction or for cloning sample partitions. The program enables to duplicate all partition data including files, the exact structure of directories and file system metadata (location of files, security information, access quotas, etc.).

The Copy Partition Wizard will help you copy a partition of any file system. To minimize the possibility of making any mistake, the wizard provides auxiliary information on every single option. Moreover you can get an in-depth description to any setting, control, or field of the wizard just by clicking the hint button and then the object you need.

Startup

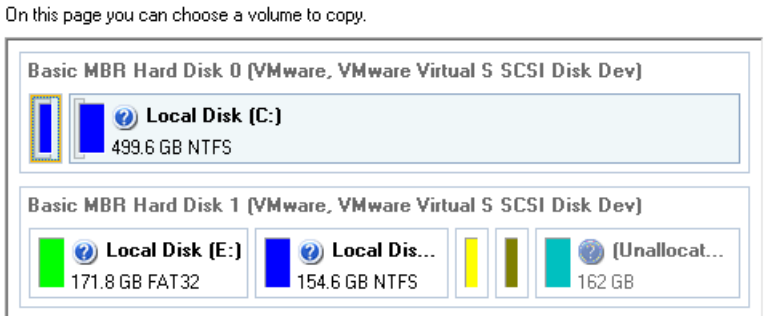
- Click the **Copy & Migration** tab on the Ribbon Panel, then select **Copy Partition**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

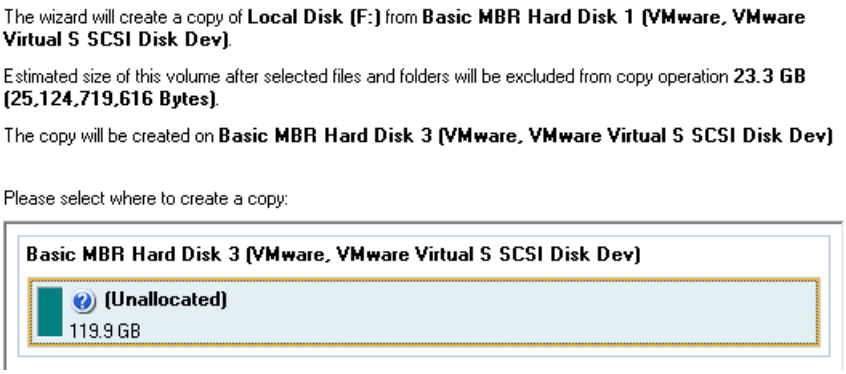
Setup

The wizard offers the following steps to accomplish the copy partition operation:

- **The partition to copy**. Select a partition you want to copy.



- **Destination disk**. Select a hard disk with enough unallocated space to perform the operation.



The program enables to copy a partition to a block of free space, which is smaller than the partition itself, taking into account only actual amount of data.

- **Copy parameters**. The wizard enables to specify the following options:

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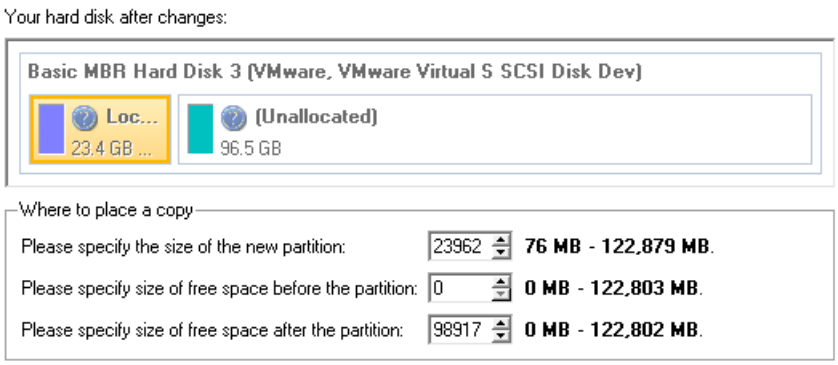

- **Partition size**. Define the size (in Mb) of the copied partition.

- **Free space before**. Define the position (in Mb) of the copied partition relative to the beginning of the available range of disk space.

- **Free space after**. Define the amount of trailing free space (in Mb) at the end of the available range of disk space.

Partition size and position may also be defined by using the drag-and-drop technique. To do that, just carry out the required operation on the Disk Map.

- **Create new EFI boot entry for destination drive**. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the following option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through Boot Corrector.

The option above will be available to the user only if the target disk becomes Bootable GPT as a result of the migration process.

Result

After the operation is completed you receive a fully functional duplicate of the existing partition.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

Boot Management

Our program enables to easily manage several operating systems on one computer with the help of the Boot Manager Setup Wizard. Among the key features of the wizard the following should be mentioned:

- Up to 16 operating systems on one PC;
- Secure adding/removing of the Boot Manager startup record to/from the MBR;
- Auto Boot option to automatically start up the previously chosen OS after a certain time period;
- Hiding of any primary partition except selected at the moment.

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Startup

- Click **Tool Button**, then select **Setup Boot Manager…**

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

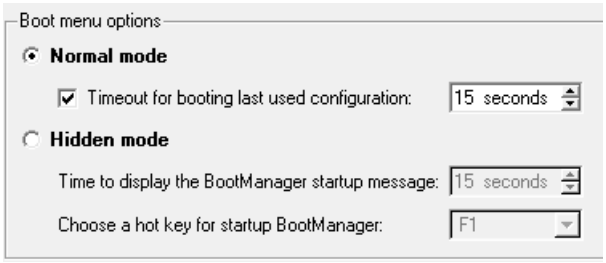
Setup

The wizard offers the following steps to accomplish the operation:

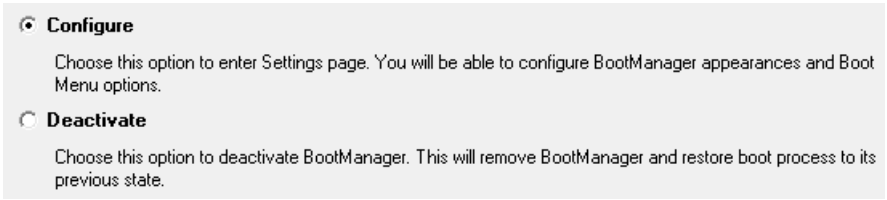
- **Boot menu options**. In this section you can switch between the following modes:

  - **Normal mode**. Choose this mode to display the boot menu every time the computer starts up and define a timeout on the expiry of which the program will automatically select the previously chosen item of the menu.

  - **Hidden mode**. Choose this mode not to display the boot menu until pressing a hot key. For this mode you should define a hot key used to enable the Boot Manager and a time period in seconds the startup message will be displayed.



- **Deactivating/Configuring the Boot Manager**. These two options will only be available once the wizard has been completed and launched again. Select the Deactivate option to remove the Boot Manager from the MBR (Master Boot Record) or Configure to modify the previously set parameters of the startup process.



Result

After the Boot Manager Setup Wizard is completed the program updates the original record in the MBR to get control of the booting process and to be able to display the boot menu.

Available operation scenarios:

- Creating Dual Boot Systems

Partition Management

In this chapter you will find all the information necessary to carry out partitioning operations supported by the program.

Basic Partitioning Operations

Here you can learn how to accomplish basic partitioning operations (create, format, delete).

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Creating Partitions

The program provides the ability to create a new partition within a block of un-partitioned space.

Restrictions

1. Do not use the Create Partition function in order to undelete the last deleted partition.
2. The program allows creating new partitions only within blocks of un-partitioned space. It cannot convert a free space on an existing partition to a new partition.
3. The program cannot create new partitions on Dynamic Disks.

Express Create Partition Wizard Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Express Create**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Create Partition Wizard Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Create Partition**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Dialog Startup

1. Select a block of free space on the Disk Map;
2. Call a context menu for the selected object by the right mouse click, then select **Create Partition**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Express Create Partition Wizard Setup

Thanks to a highly intelligent work algorithm, the wizard requires minimal involvement in the operation, thus you only need to choose a method you find the most suitable to create the partition (if several available), which actually differ in the amount of space to allocate. For easy perception, you can see the resulted disk layout on the disk map by selecting this or that mode.

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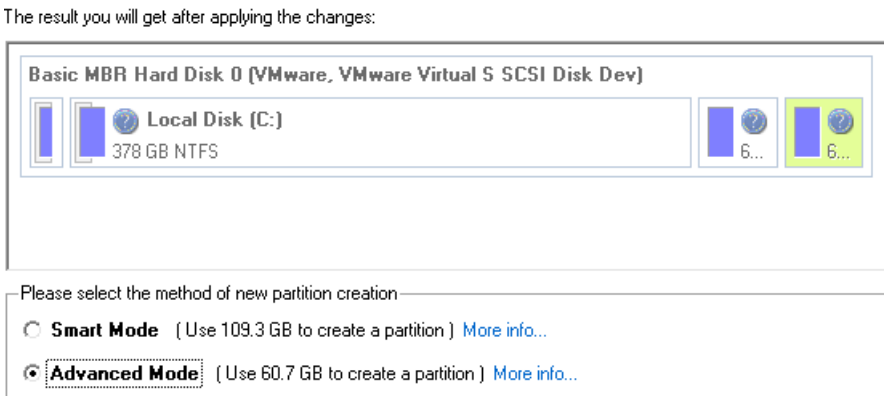


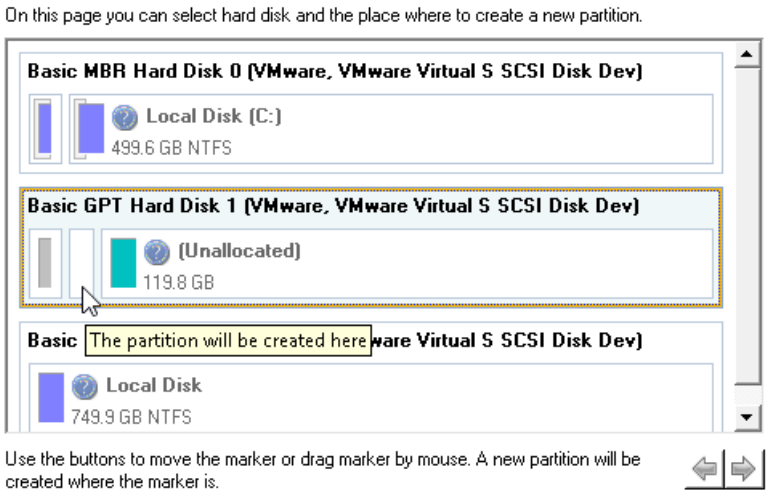
The number of available methods depends on your disk layout.

To learn more on the way the wizard works, please click the corresponding link on the first page of the wizard.

Create Partition Wizard Setup

The wizard offers the following steps to accomplish the operation:

- **Partition destination**. Select a hard disk (if the computer has several hard disks) and then choose position for the future partition on the disk: at the end (preferable), at the beginning or somewhere in the middle between other partitions.



By default, the program allows you to create a new partition only as the last primary or as the last logical drive within the extended partition. However, by activating the advance mode on the first page of the wizard you can remove this restriction that in its turn might result in some boot problems.

- **Partition size**. There is no restriction on size of the future partition, merely depending on space available on the hard disk.

  If there is not enough free space in one block, the wizard enables to redistribute free space, joining all free space blocks together into one united block and moving partitions when necessary. If the total amount of free

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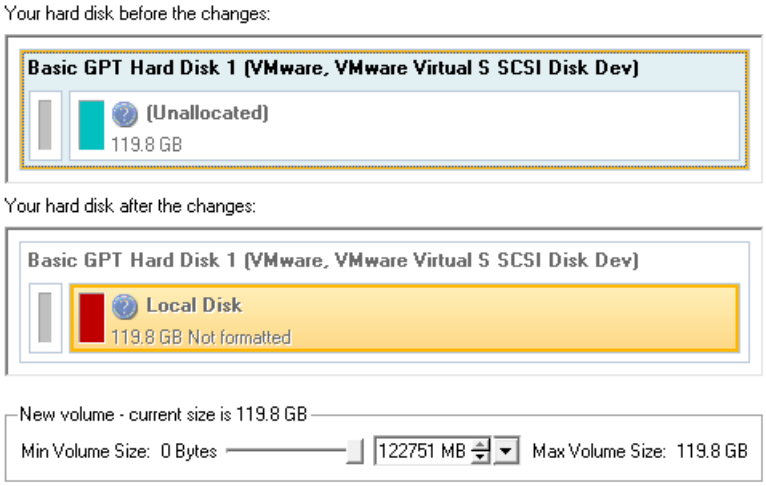
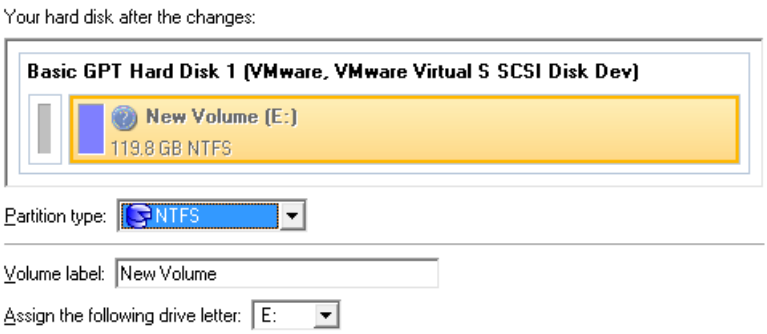
space is still not enough, it is possible to split a fragment of space from one of the existing partitions, thus resizing it.



If a partition to resize is locked and cannot be processed, the wizard makes the system reboot to create the partition and then automatically boots the system again. (The rebooting mechanism is different for different versions of Windows.)

You can also choose whether the future partition will be primary or logical by marking the appropriate checkbox.

- **Partition properties**. On the next page of the wizard you can set a number of additional parameters:



- **Partition type**. From the pull-down list select a file system the newly created partition will be formatted to, otherwise the partition will remain unformatted (so that it will not be ready to use).

- **Volume label**. Enter a label for the selected partition in this textual field. It is an irrelevant parameter usually used for drive identification.

- **Surface test level**. Define the level of the surface check to make the program find bad and unstable sectors and mark them unusable in the file system metadata.

Dialog Setup

Initially the program suggests some consistent values for all parameters. In most cases, you can just press the Yes button to confirm the operation.

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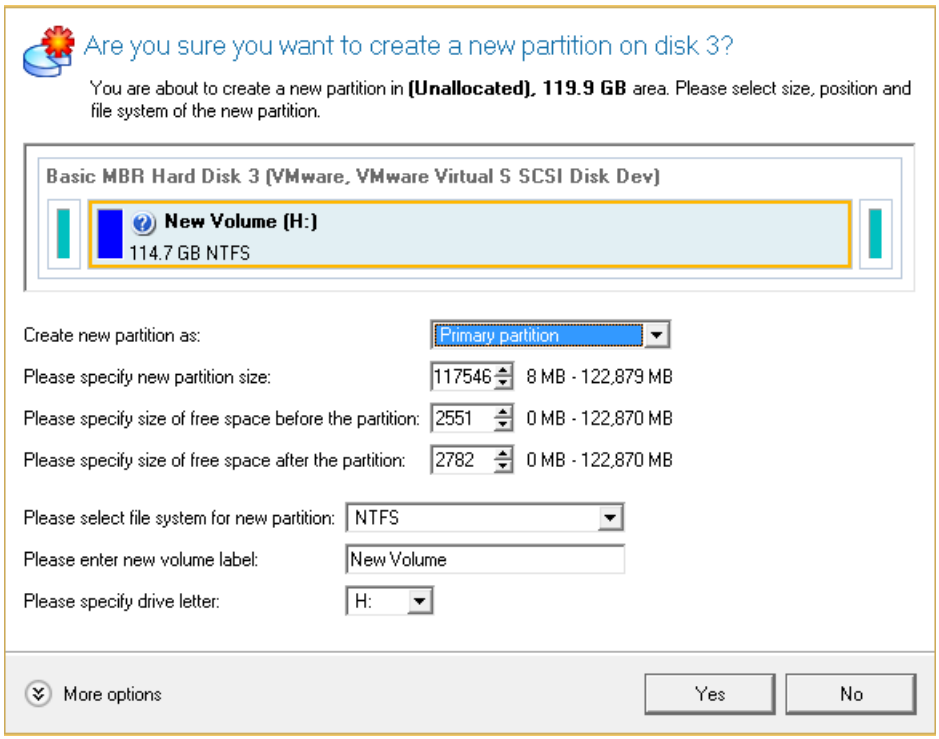

- **Define whether the partition will be Primary, Extended or Logical**. You can choose the desired partition type from the pull-down list. As a matter of fact, the available alternatives fundamentally depend on the selected block of free space - within the Logical free space, only Logical partitions can be created; Within the Primary free space, both Primary partitions or the Extended Partition can be created.
- **Partition Size**. Define the size (in Mb) of the new partition.
- **Free space before**. Define the position (in Mb) of the new partition relative to the beginning of the block of free space.
- **Free space after**. Define the amount of trailing free space (in Mb) at the end of the new partition.

Partition size and position may also be defined by using the drag-and-drop technique. To do that, just carry out the required operation on the Disk Map. The virtual operations are to be available.

- **File system for new partition**. From the pull-down list select a file system the newly created partition will be formatted to, otherwise the partition will remain unformatted (so that it will not be ready to use).
- **Volume label**. Enter a label for the selected partition in this textual field. It is an irrelevant parameter usually used for drive identification.
- **Drive letter assignment**. The pull-down list contains vacant drive letters that can be associated with the newly formatted partition.

In addition, there is the possibility to make further detailed settings (although the default values will do in most cases). To activate the advance mode, you need to click the More options button at the foot of the dialog page. Depending on the chosen file system, the following options become available:

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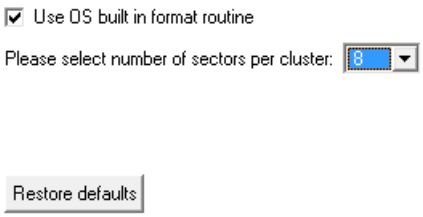

- **Use OS built-in routine**. Mark the option to restrict the available values according to the used OS.
- **The amount of sectors per cluster**. Define the Cluster Size for the formatted partition with this spinner control.

Number of available options depends on the selected file system type.

Result

After the operation is completed you receive a fully functional partition.

Available operation scenarios:

- Creating a new partition to detach operating system from the rest of data

Formatting Partitions

Any partition should contain some file system to be used for keeping data. The process of installing a file system is commonly known as formatting. A huge variety of file systems have been developed these days.

Supported File Systems

The program provides the ability to format partitions of the following file systems:

- FAT12 & FAT16
- FAT32
- HFS+
- NTFS
- Ext2
- Ext3
- Ext4
- Linux Swap v. 2

Wizard Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Format Partition**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Dialog Startup

1. Select a partition on the Disk Map;

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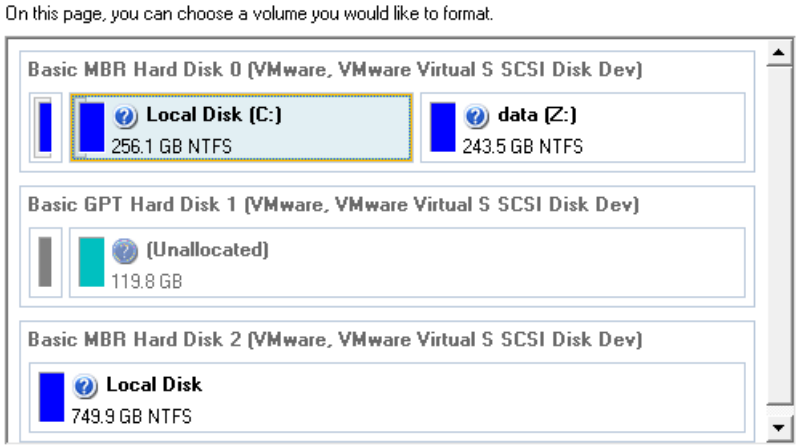
2. Call a context menu for the selected object by the right mouse click, then select **Format Partition**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Wizard Setup

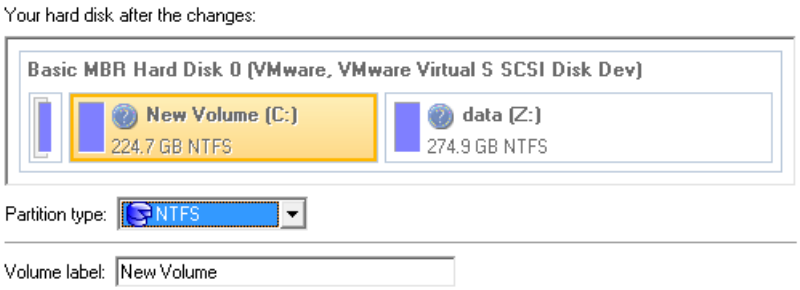
The wizard offers the following steps to accomplish the operation:

- **Partition to format**. Select a hard disk (if the computer has several hard disks) and then the required partition to format.



As a result of this operation contents of the selected partition will be lost.

- **Partition properties**. On the next page of the wizard you can set the following partition parameters:



- **Partition type**. From the pull-down list select the desired file system type. In fact, the program displays only those file systems that can correctly be placed to the selected partition, taking its capacity into account.

- **Volume label**. Enter a label for the selected partition in this textual field. It is an irrelevant parameter usually used for drive identification.

- **Drive letter assignment**. The pull-down list contains vacant drive letters that can be associated with the newly formatted partition.

In addition, there is the possibility to make further detailed settings (although the default values will do in most cases). To activate the advance mode, you need to mark the appropriate option at the foot of the page. When it is marked, the next page enables to define:

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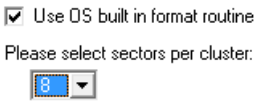
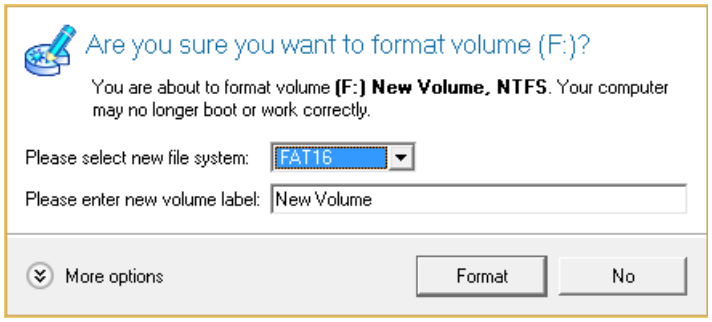


- **Use OS built-in routine**. Mark the checkbox to restrict the available values according to the used OS.
- **The amount of sectors per cluster**. Define the Cluster Size for the formatted partition with this spinner control.

Number of available options depends on the selected file system type.

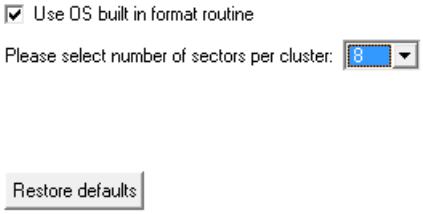
Dialog Setup

Initially the program suggests some consistent values for all parameters. In most cases, you can just press the Format button to confirm the operation.



- **File system**. From the pull-down list select the desired file system type. In fact, the program displays only those file systems that can correctly be placed to the selected partition, taking its capacity into account.
- **Volume label**. Enter a label for the selected partition in this textual field. It is an irrelevant parameter usually used for drive identification.

In addition, there is the possibility to make further detailed settings (although the default values will do in most cases). To activate the advance mode, you need to click the More options button at the foot of the dialog page. Depending on the chosen file system, the following options become available:



- **Use OS built-in routine**. Mark the checkbox to restrict the available values according to the used OS.
- **The amount of sectors per cluster**. Define the Cluster Size for the formatted partition with this spinner control.

Number of available options depends on the selected file system type.

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Result

After the operation is completed you receive a fully functional partition formatted to the specified file system.

Deleting Partitions

Wizard Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Delete Partition**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Dialog Startup

In order to start the operation you should take the following steps:

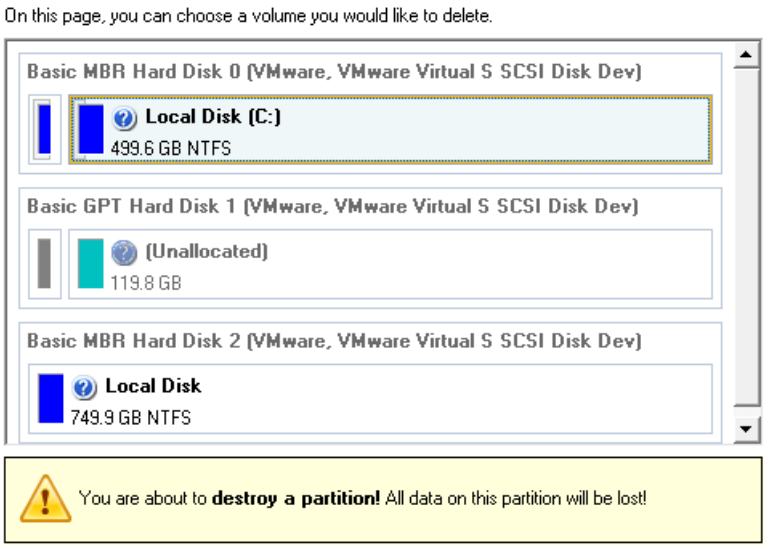
1. Select a partition on the Disk Map;
2. Call a context menu for the selected object by the right mouse click, then select Create **Delete Partition**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Wizard Setup

The wizard offers the following steps to accomplish the operation:

- **Partition to delete**. Select a hard disk (if the computer has several hard disks) and then the required partition to delete.



As a result of this operation contents of the selected partition will be lost.

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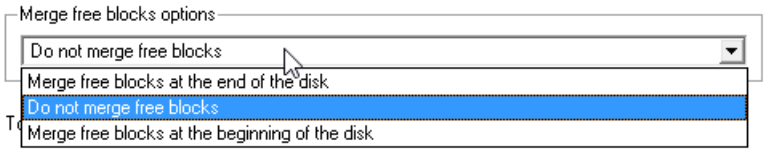
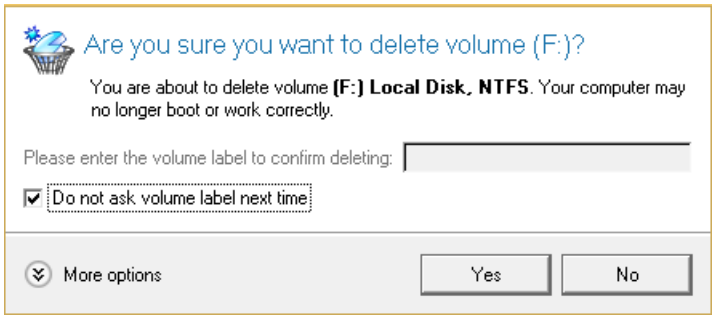
- **Merge free blocks**. As a result of the operation you may get several blocks of the unallocated space on the hard disk. So choose whether to merge them all and place at the beginning of the disk or at the end by selecting the required operation from the pull-down list.



Dialog Setup

Initially the program suggests you just to remove references to the selected partition from the Partition Table.



- **Enter the volume label to confirm deleting**. To confirm deletion of the selected partition, enter its Volume Label. The current volume label is displayed above.
- **Do not ask volume label next time**. Mark the option to inhibit confirmation next time you start the dialog.

Result

By default, the operation takes only a fraction of a second. However, the program waits until Windows completes the modification of the disk layout.

Advanced Partitioning Operations

Here you can learn how to accomplish advanced partitioning operations.

Merging Partitions

The Merge Partitions Wizard enables to consolidate the disk space, which originally belongs to two adjacent partitions (or additionally separated by free blocks), into a single, larger partition. The order, in which two partitions have been chosen, is important since all contents of the second selected partition will be placed in a folder on the resulted joined partition.

The program provides the ability to merge only NTFS, FAT16 or FAT32 partitions.

Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Merge Partitions**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Setup

The wizard offers the following steps to accomplish the operation:

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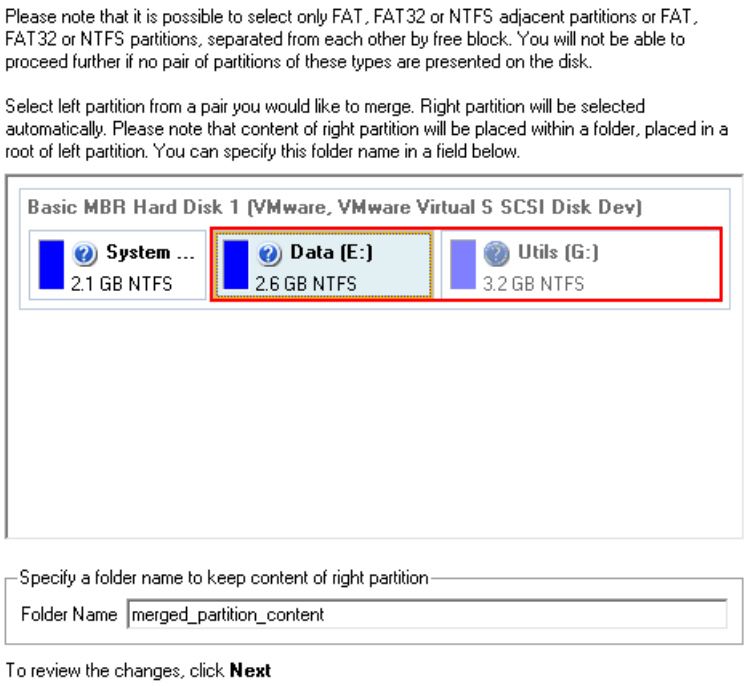
- **Adjacent partitions to merge**. Click on the left partition of the pair of partitions you need to merge, as the right one will be selected automatically. During the operation all contents of the right partition will be placed in a folder on the resulted joined partition. By default, the program offers an easy-to-understand folder name, which can be customized however.



If a system partition is the right one of the selected pair, Windows OS will become unbootable after the merge operation is over.

Result

After the operation is completed the disk space of the two adjacent partitions will be consolidated.

Redistributing Unused Space between Partitions

Express Resize Partitions Wizard

The Express Resize Partitions Wizard enables to easily increase free space on one partition by up-taking the unused space of an adjacent partition of your hard disk.

Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Express Resize Partitions**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Setup

The wizard offers the following steps to accomplish the operation:

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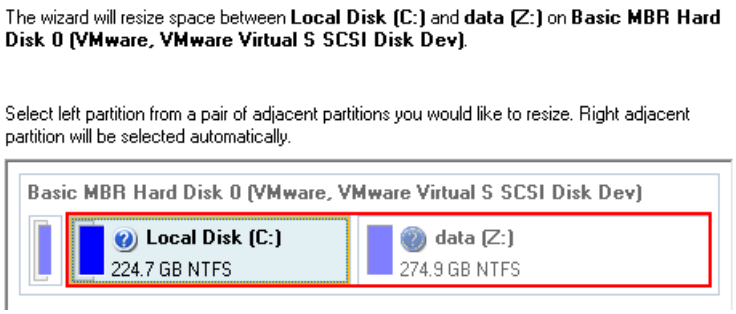
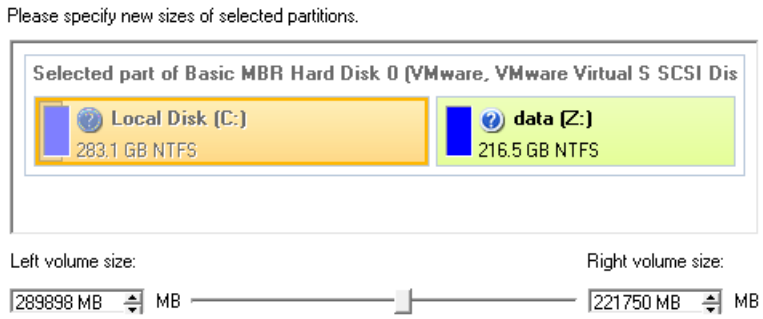
- **Adjacent partitions to resize**. Click on the left partition of the pair of partitions you need to redistribute the unused space between, as the right one will be selected automatically.



- **Resulted size of partitions**. Redistribute the unused space between the partitions with the slider or manually by entering the required value.



Result

After the operation is completed the unused space between the specified partitions will be redistributed according to your needs.

Available operation scenarios:

- Increasing size of a system partition by taking unused space of an adjacent logical partition
- Resizing partitions of Apple Boot Camp

Redistribute Free Space Wizard

The Redistribute Free Space Wizard helps to increase free space on one partition by up-taking the on-disk unallocated space and the unused space of other partitions. By default, the wizard adds to the target partition all existing blocks of the free space. Besides you can specify partitions to act as a space donor. The wizard will automatically recalculate positions of the partitions and move their contents to new locations.

Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Redistribute Free Space**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Setup

The wizard offers the following steps to accomplish the operation:

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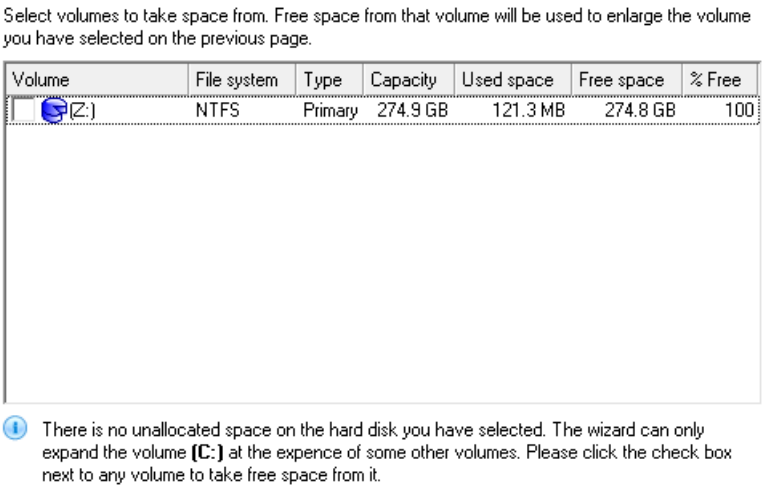
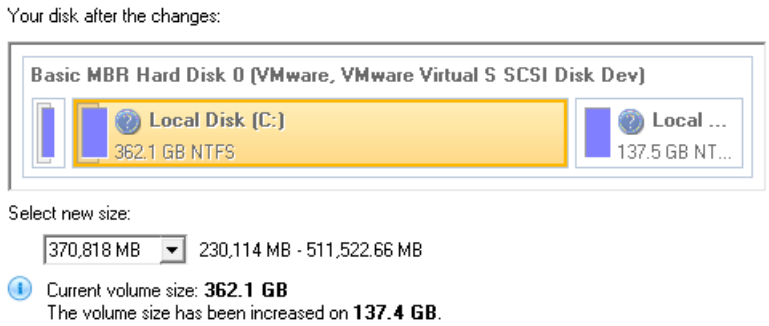
- **Partition to enlarge**. Select a partition, the size of which will be increased at the expense of other partitions. Blocks of the free space (if any) will be automatically added to the target partition.

- **Partition to donate**. Choose any partition(s) (not only adjacent) to donate free space.



- **Partition size**. By default, the program leaves 50% of the unused space on a partition and removes another 50% to add it to the target partition. However, the size to take can be customized by moving the slider or by manually entering the exact value.



Result

After the operation is completed free space of the specified partition will be increased by up-taking the on-disk unallocated space and the unused space of other partitions.

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Undeleting Partitions

When simply deleting a partition (without additional wiping) disk management software only removes references to it in the Partition Table, thus leaving the possibility to recover it later.

The program enables to find and recover these partitions. A restored partition will be fully functional, as long as other partitions were not created, moved or exceeded the disk space occupied by that partition. That is why the program offers this function only for blocks of free space.

The operation can be accomplished with the Undelete Partition Wizard.

Startup

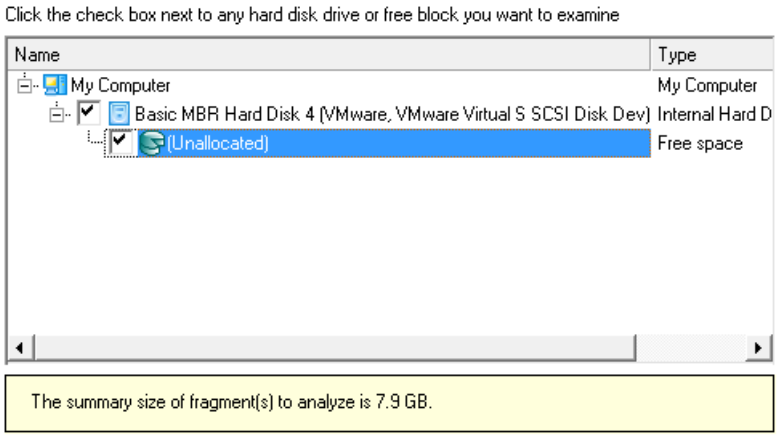
- Click the **Partitioning** tab on the Ribbon Panel, then select **Undelete Partitions**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

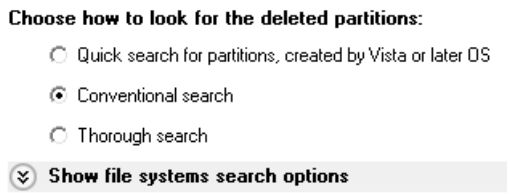
Setup

The wizard offers the following steps to accomplish the undelete partition operation:

- **Free blocks to scan for lost partitions**. Choose a free block from a tree-like list of available hard disks.



- **Search method**. By default, the wizard selects the fastest search method for your operating system. In most cases that will do to find any accidentally deleted partition. However if you're under Windows XP for instance (the Conventional Search option is selected), but the deleted partition you're looking for has been created with the Disk Management utility under Vista, the wizard won't be able to find this partition, unless you manually select the appropriate option (Quick Search for Partitions Created by Vista or Later OS). Moreover if the wizard still fails to find the partition you need, you can select the Thorough Search option to scan every single sector in the specified search area to get the most accurate results.



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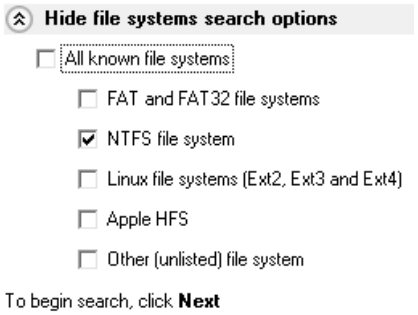
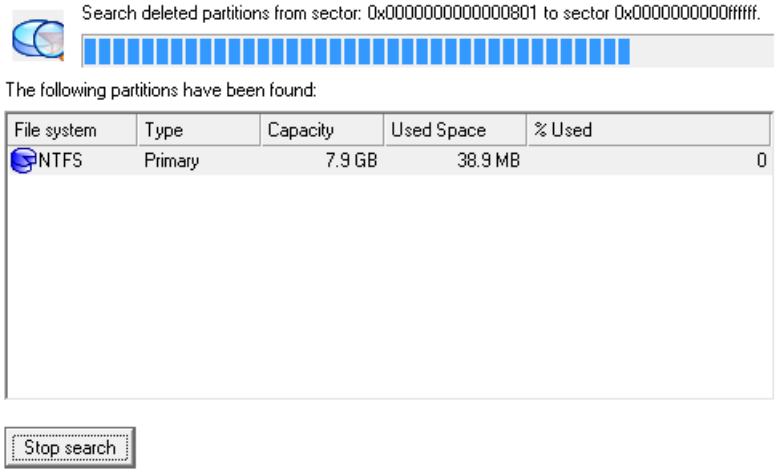
To know more on the available search methods, please use the context sensitive hint system.

- **File system filter**. By default, the wizard will search for all known file systems. However, by clicking on the appropriate option on the second page of the wizard, you can specify only those file systems you need.



- **A partition to undelete** (if several). By default, the program searches records of any deleted partition ever existed on the selected block of free space. So you can get several partitions to choose from.



Most likely the required partition will be found first. If so, you may abort the search operation by pressing the Stop search button.

Result

After the operation is completed you receive a fully functional partition.

Installing a New Operating System

Getting your computer ready to install a new operating system, especially when it is going to be an additional OS in the system, is a rather complicated task that implies quite a number of operations, from allocating space to create a new partition (resize, redistribution of free space) to formatting of the newly created partition to a particular file system and checking its surface for bad sectors to avoid possible data loss. Operating systems today are being supplied with basic tools of partitioning that only enable to create a partition (in case there is enough unallocated space on the disk) and then format it to the specified file system type. Our program offers a handy Install New OS Wizard to easily carry out all the necessary operations to install a new operating system.

Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Install New OS Wizard**.

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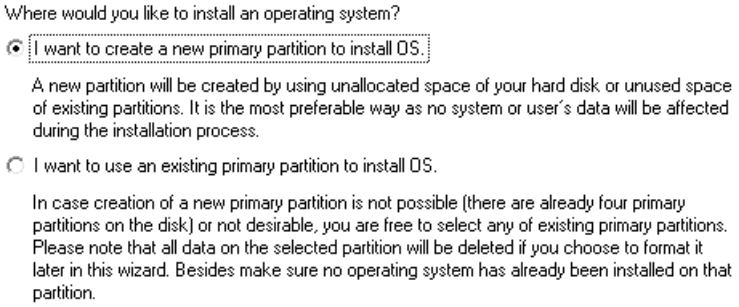
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Setup

The wizard offers the following steps to accomplish the operation:

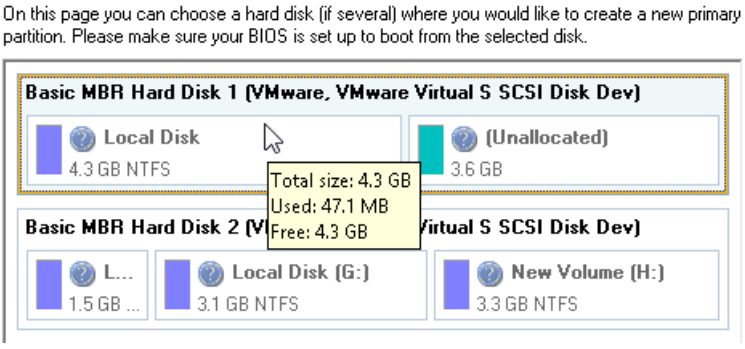
- **Partition to install a new operating system**. The program offers two ways of installing a new OS, i.e. to create a new primary partition for it or use an existing one.



Only primary partitions can be used to install an operating system.

- In case the first option has been marked, the wizard enables to specify:

A hard disk (if several) where a new partition will be created. Thanks to an advanced program engine it is possible to use unallocated space of the disk (if any) and unused space of existing partitions to create a new partition;



To avoid any possible problems, the new partition will in no way be created as the first partition of the disk which already contains at least one partition.

And its size. If there are blocks of the free space on the disk, the wizard will merge them all and allocate the resulted space for a new partition in the first place. If not, it will take 50% of the unused space of an adjacent partition. However, the size to take can be customized by moving the slider.

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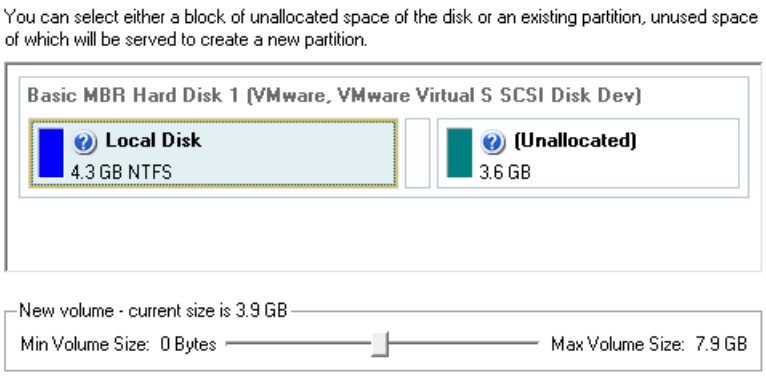
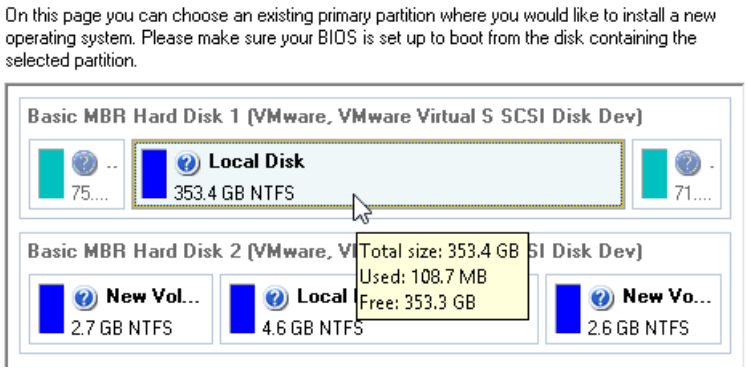
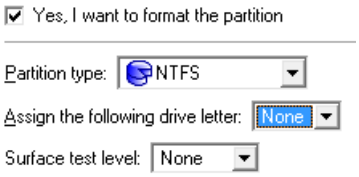


- In case the second option has been marked, the wizard enables to choose an existing primary partition to install a new operating system.



Your computer may fail if any other OS has already been installed on the selected partition.

- **Partition properties**.



- **Partition type**. From the pull-down list select the desired file system type. In fact, the program displays only file systems that can be correctly placed to the selected partition, taking its capacity into account.

- **Drive letter assignment**. The pull-down list contains vacant drive letters that can be associated with the newly formatted partition.

- **Surface test level**. Define the level of the surface check to make the program find bad and unstable sectors and mark them unusable in the file system metadata.

- **OS Label**. Enter a label for the selected partition in the textual field. It will later be used for the drive identification.

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Result

As the final step the wizard will offer you to insert a distributive CD/DVD of the new operating system and restart the computer to launch the installation procedure.

The program will update your MBR, so most likely you won't be able to start up any of the previously installed operating systems. Please launch the Boot Manager Setup Wizard after the installation has been completed to fix this issue.

Available operation scenarios:

- Creating Dual Boot Systems

Moving/Resizing Partition

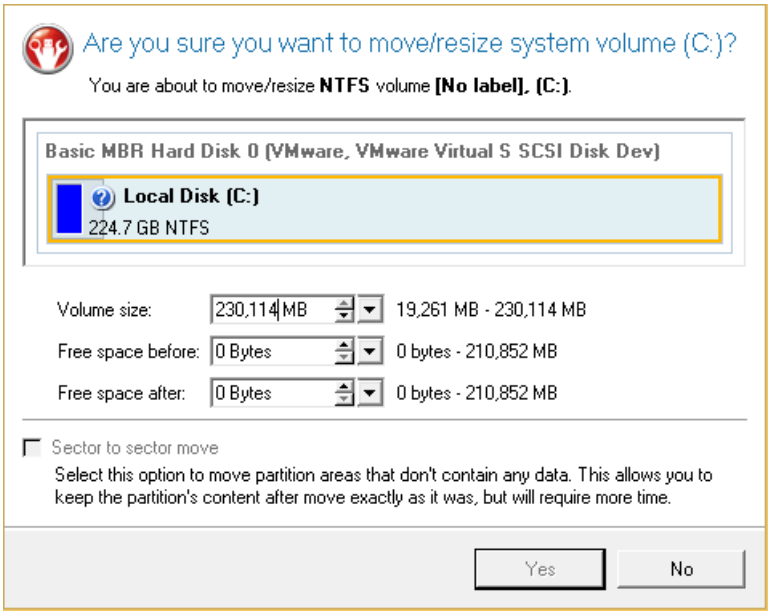
The Move/Resize Partition function allows you to resize or change location of any partition without destroying its data.

In order to move/resize a partition you should take the following steps:

1. Select a partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Move/Resize Partition…**

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. Define parameters of the operation.



- **Volume size**. Define size (in Mb) of the modified partition.
- **Free space before**. Define the partition position (in Mb) relative to the beginning of the available range of disk space.

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- **Free space after**. Define the amount of trailing free space (in Mb) at the end of the available range of disk space.
- **Sector to sector move**. Mark the checkbox to move the partition in the sector-by-sector mode to process its unused space as well. This can help to avoid problems with hidden data created by certain applications or the system administrator. However, it will take more time to accomplish the operation.

Partition size and position may also be defined by using the drag-and-drop technique. To do that, just carry out the required operation on the Disk Map. The virtual operations are to be available.

When resizing a FAT16 partition beyond the 2GB limit (maximum file system size), the partition will automatically be converted to FAT32.

The program enables to enlarge NTFS partitions (system, locked) without rebooting Windows and interrupting its work, providing 100 percent guarantee that your data is kept intact.

---

4. The operation will be performed immediately after confirmation.

Available operation scenarios:

- Increasing size of a system partition by taking unused space from any other
- Shrinking a system partition to increase size of a data partition

Converting File System

With our program you can change type of the used file system without destroying its data. While performing the operation, it first checks the current file system for consistency and then verifies whether the on-partition data meet the requirements of the desired file system or not. After having passed the testing, the program re-organizes the file system metadata and user files.

The program enables to convert the following file system types:

- FAT16/32 <> NTFS

- NTFS <> HFS

In order to convert a file system you should take the following steps:

1. Select a partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Convert file system…**

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

---

3. Initially the program suggests some consistent values for all parameters. In most cases, you can just press the Convert button to confirm the operation.

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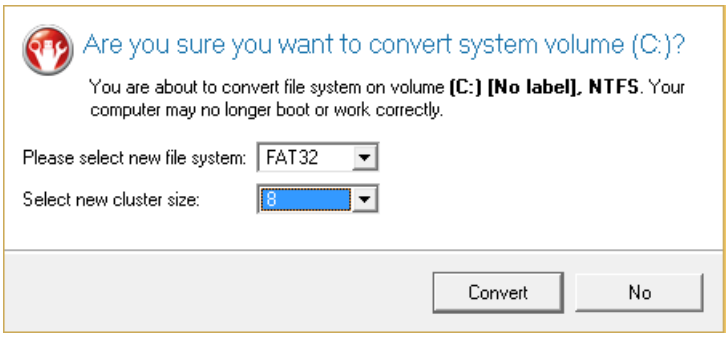


- **New file system**. From the pull-down list choose a file system you would like to convert to. Actually the program only displays variants available for the operation, taking into account the current parameters of the selected partition and limitations of the used file system.
- **New cluster size**. Define the cluster size for the partition. This parameter can have a profound effect on the overall performance. In a nutshell, larger clusters waste more space, but generally provide for slightly better performance, because of less fragmentation. So be particularly careful with it.

The cluster size value is expressed in sectors per cluster. To get it in Kbytes, please divide it into half.

You may only decrease the current cluster size.

- **Surface test level**. Define the level of the surface check to make the program find bad and unstable sectors and mark them unusable in the file system metadata.

4. The operation will be performed immediately after confirmation.

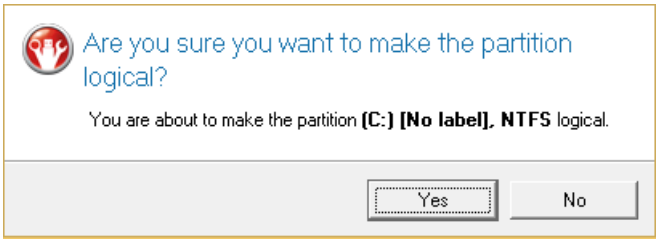
Making Logical/Primary

The program allows you to include a primary partition in the extended partition, or exclude a logical partition from the extended partition, without partition duplication.

In order to change a partition type you should take the following steps:

1. Select a primary or logical partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Make Partition Logical/Primary**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.



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The Make Primary > Logical option is only available when the selected partition is adjacent to the extended partition and vice versa.

The Make Primary > Logical option of the system partition will result in inability to boot the operating system.

3. The operation will be performed immediately after confirmation.

Changing Partition Attributes

This chapter explains how you can change partition attributes (Active flag, Hidden flag, Volume Label, etc.).

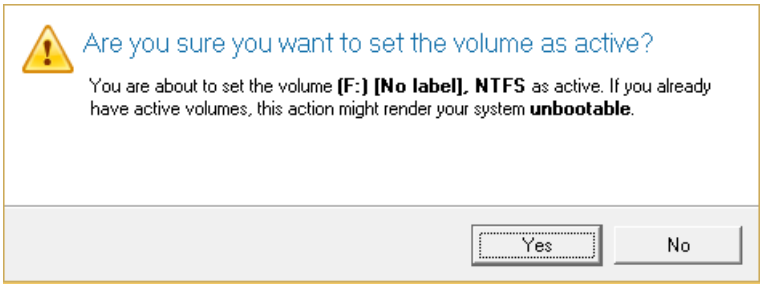
Mark Partition Active/Inactive

The program enables to set an active/inactive flag for primary partitions of a hard disk. By default, an operating system will boot only if its partition is active or bootable.

In order to mark a partition active/inactive you should take the following steps:

1. Select a primary partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Mark Partition as Active/Inactive**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.



3. The operation will be performed immediately after confirmation.

There can only be one active partition on a hard disk, otherwise your operating system will fail to boot.

Hide/Unhide Partition

The program allows you to hide/unhide primary and logical partitions. By default, an operating system does not mount hidden partitions, thus preventing access to their contents.

In order to hide/unhide a partition you should take the following steps:

1. Select a partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Hide/Unhide Partition**.

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There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. The operation will be performed immediately after confirmation.

It is strongly recommended not to hide the system partition. Otherwise your operating system will fail to boot.

Set Label of a Partition

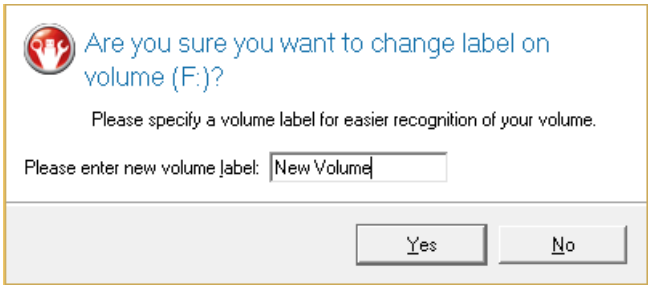
The Partition Label is a small textual field (up to 11 characters) that is located in the partition's boot sector. It is detectable by any partitioning tool and is used for notification purposes only.

In order to change a partition label you should take the following steps:

1. Select a partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Change Volume Label**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. Enter a label for the selected partition.



4. The operation will be performed immediately after confirmation.

Hard Disk Management

In this chapter you will find all the information necessary to carry hard disk operations supported by the program.

Converting Basic MBR to GPT

The program allows you to easily convert a basic MBR disk into a basic GPT disk while keeping its contents intact. The operation is quite safe for the on-disk data, but you should know that only 64-bit Windows OSes since Vista are able to boot from this type of disks. So if you've got a 32-bit Windows OS accommodated on a disk you'd like to convert to GPT, it won't start up after the operation is over.

In order to convert a basic MBR disk to a basic GPT you should take the following steps:

1. Select a basic MBR hard disk on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Hard Disk > Convert to GPT hard disk**.

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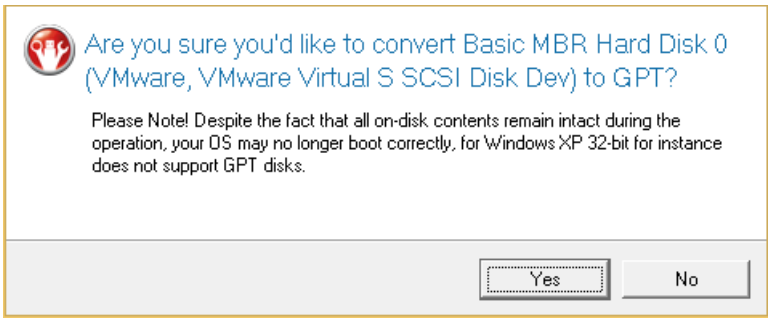


3. The operation will be performed immediately after confirmation.

The program can only convert basic MBR disks.

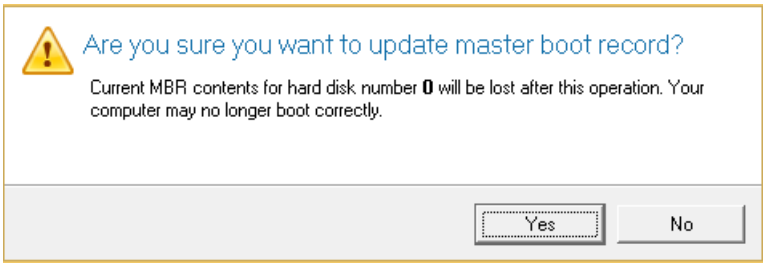
Updating MBR

The program enables to overwrite the current bootable code in the MBR (Master Boot Record) by the standard bootstrap code. This can help to repair a corrupted bootable code of a hard disk resulted from a boot virus attack or a malfunction of boot management software.

In order to update MBR of a hard disk you should take the following steps:

1. Select a hard disk on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Update MBR**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.



3. The operation will be performed immediately after confirmation.

Wipe Tasks

In this chapter you will find all the information necessary to wipe a partition of any file system or only destroy any remnants of deleted files/directories left on disk without affecting the used data, thus providing high level of security.

The operation can be accomplished with the Wipe Wizard or corresponding dialogs.

Wizard Startup

- Click the **Partitioning** tab on the Ribbon Panel, then select **Wipe Partition**.

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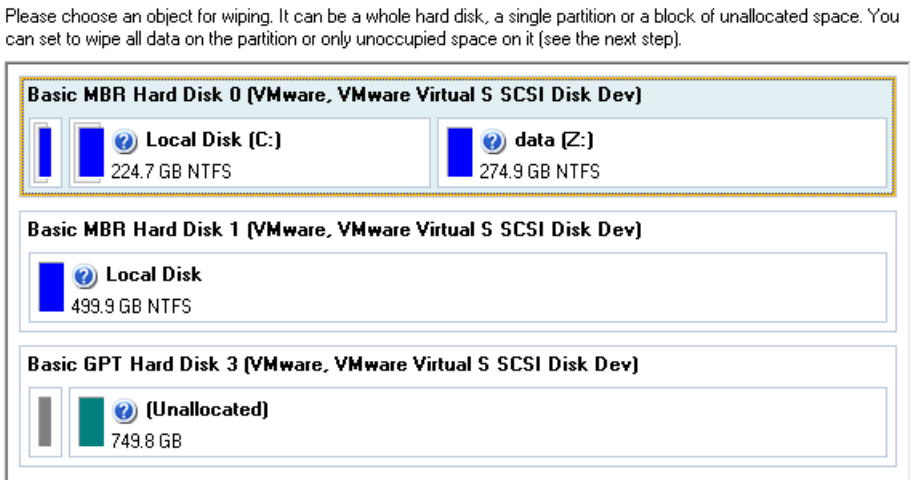
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

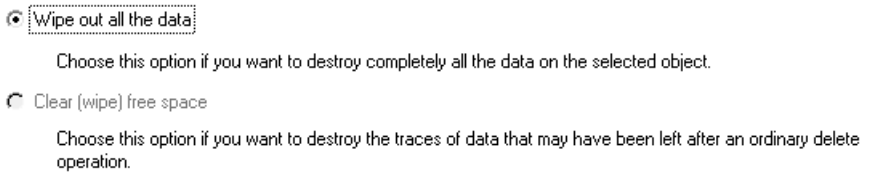
Wizard Setup

The wizard offers the following steps to accomplish the operation:

- **The partition to wipe**. Select a partition the data of which you want to destroy.



- **Wipe mode**. This section enables to switch between two options:

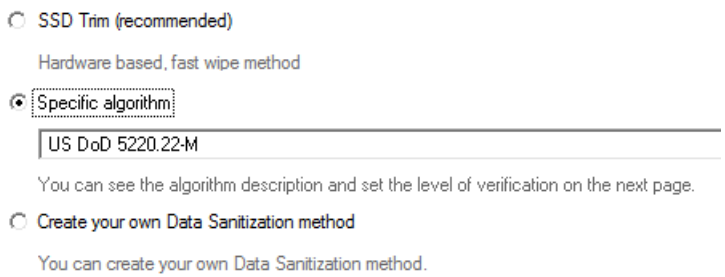


- **Wipe out all data**. Select the option to irreversibly destroy all on-disk data of the selected object.

- **Clear (wipe) free space**. Select the option to destroy any remnants of deleted files/directories left on disk without affecting the used data.

The Clear Free Space operation is available only for Logical and Primary partitions of known file systems.

- **Wipe method**. Here you can select a specific data erasure algorithm, create a customized method, or if you're going to wipe SSD, use the SSD Trim option to irreversibly destroy data on this type of storage device.



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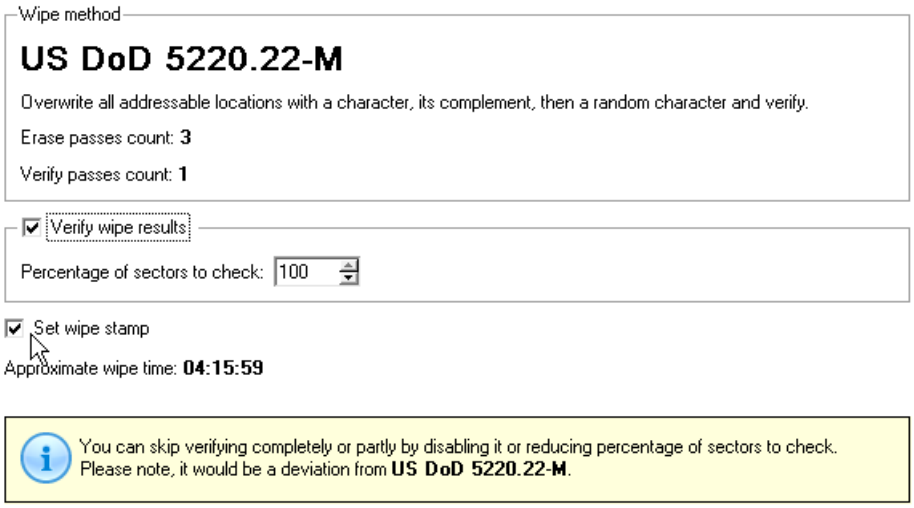
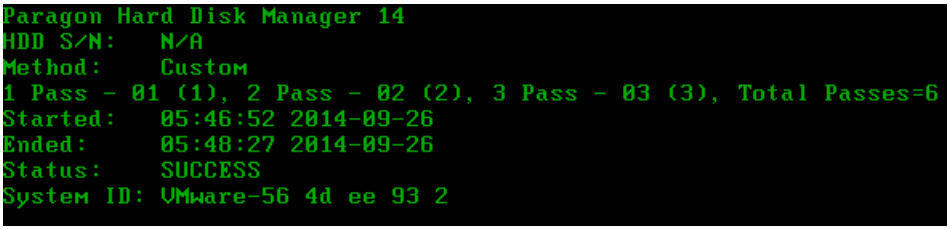
- In case you preferred to use a specific algorithm, the next page of the wizard enables to get detailed information on the selected algorithm, choose whether to carry out residual data verification or not specifying the percentage of sectors to check and estimate the time required to accomplish the operation.

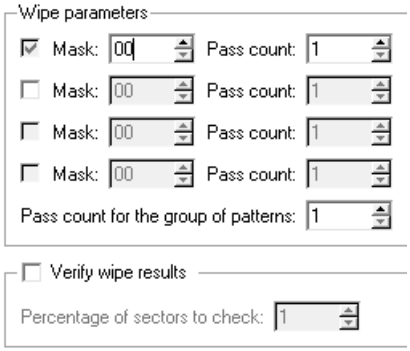


By marking the **Set wipe stamp** checkbox you make the wizard add to the MBR of the wiped storage device information on the used wipe program, algorithm, device serial number, wipe status, system ID (obtained through WMI), etc. Thus when attempting to boot from this storage, you'll be notified how and when this storage has been wiped. Please note this option is only available for wiping of entire disks.



The list of supported military and government standards may vary for your product.

- In case you preferred to create a customized algorithm, the next page of the wizard enables to define up to 4 wiping patterns, number of passes for each wiping pattern and for the group of patterns. The Mask spinner control allows you to set a two-figure hexadecimal character value ("00" by default). The available range is from "00" to "FF". You can also choose whether to carry out residual data verification or not specifying the percentage of sectors to check.



- **Revise your changes**. This page informs on all the actions to be made in the wizard in a bright, graphical form.

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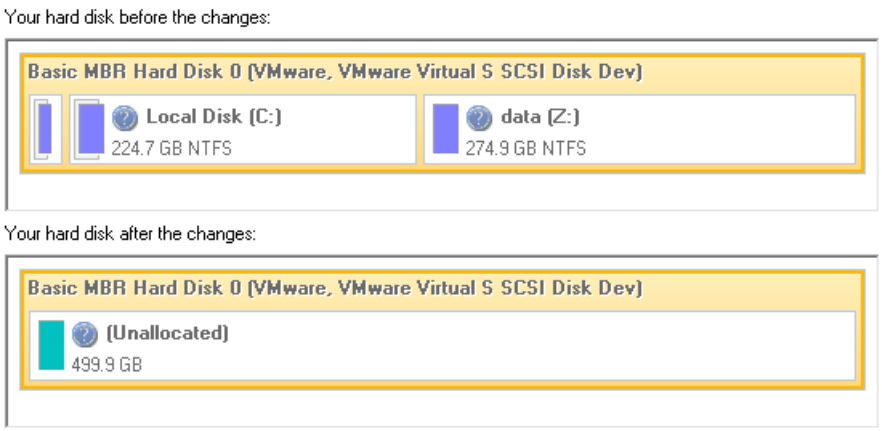
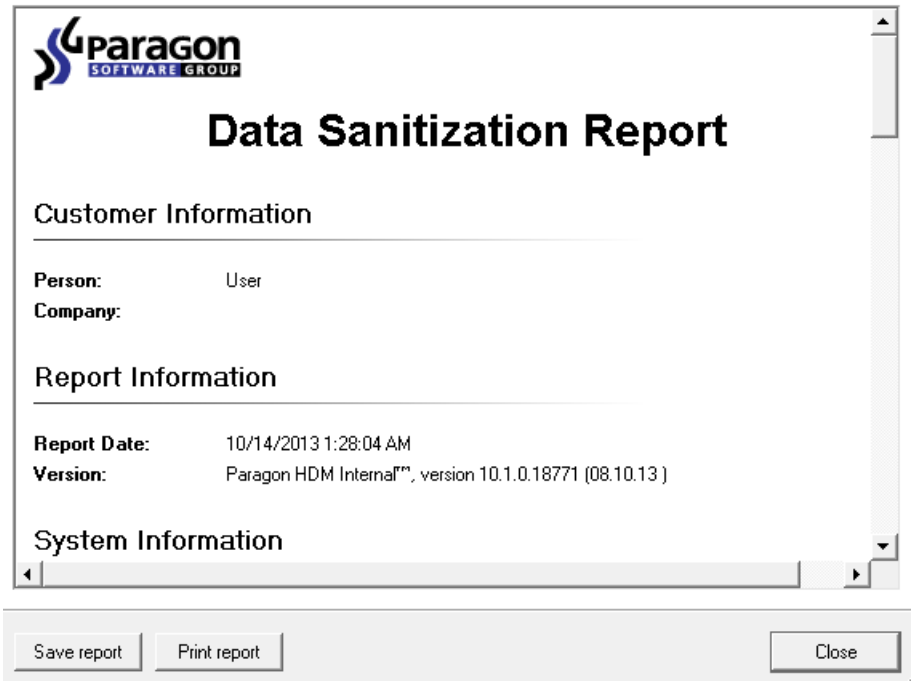


Wizard Result

After the operation is completed you can see a well informative summary page, providing structurally divided in-depth information on all the actions made in the wizard.



The program also enables to store the resulted report. To do that, just press the Save button and choose the exact location in the opened dialog.

To make sure that all on-disk data is irreversibly destroyed call the Disk Viewer dialog by clicking the appropriate tab and see it for yourself.

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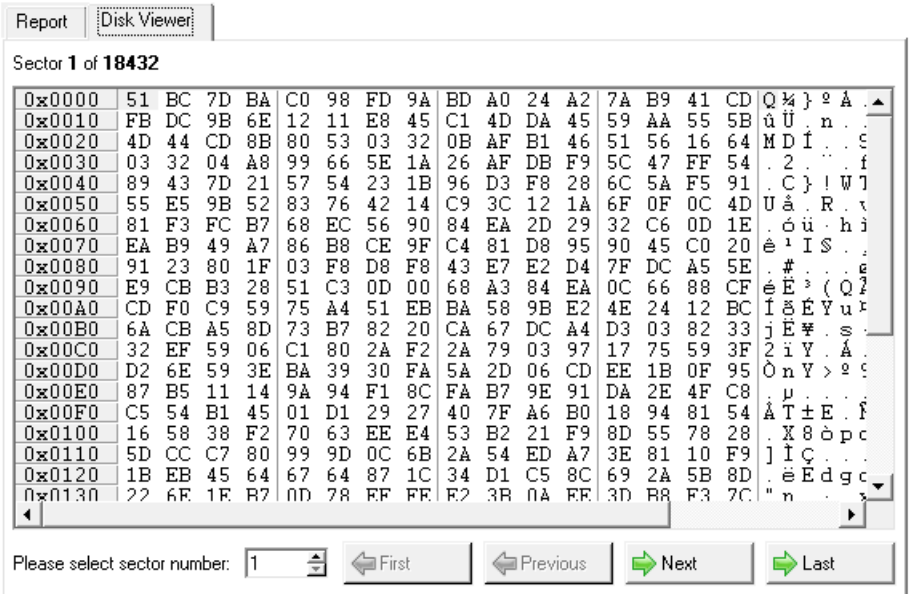


The Summary page will be available only when the Virtual operations are disabled.

Available operation scenarios:

- Hard Disk Utilization

Task Scheduling

Automation of operations can really help you out when you've got to accomplish certain routine operations on a regular basis as it enables to execute them without your involvement while optimizing your computer's work-load.

Setting a Timetable

Thanks to the embedded Scheduler, you can set a timetable for execution of any operation. It has two categories for time settings (these correspond to appropriate items in the Schedule type menu):

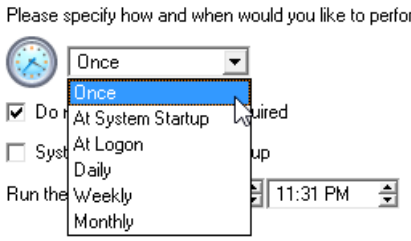
- **Initiating the operation by an event**:

  - One time only (i.e. the Once item)

  - When the system starts (i.e. the At System Startup item)

  - When the user logs on (i.e. the At Logon item).

- **Initiating the operation periodically (i.e. Daily, Weekly, Monthly)**.



You need to select one of the variants. Depending on your choice, the scheduler displays a form that enables to set a timetable.

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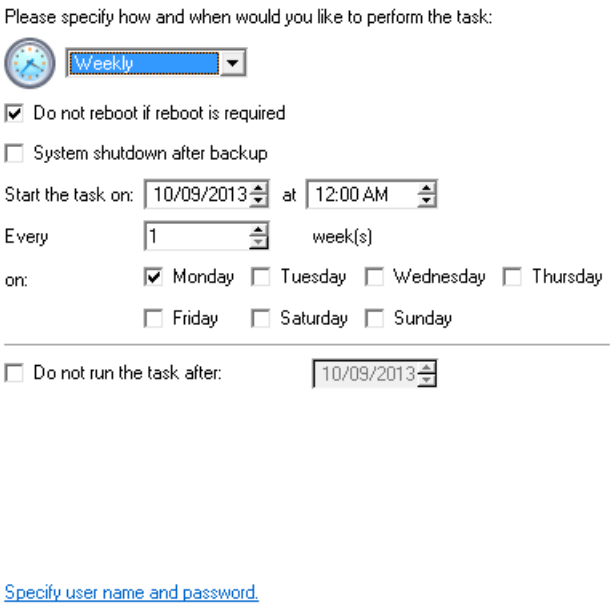
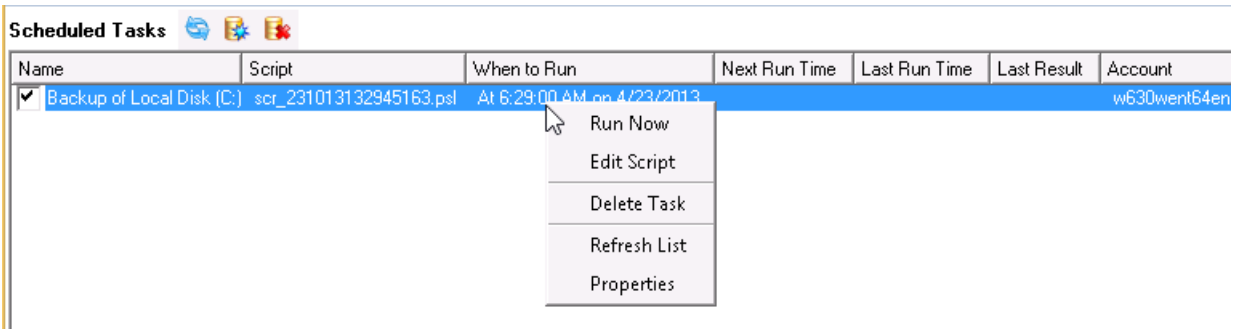


To run the task in the log-off mode, please specify administering login info by following the appropriate link in the left lower corner of the page.

The Shutdown System on Complete option enables to automatically switch off the computer on the successful accomplishment of the operation.

Managing Tasks

All scheduled tasks are placed in a separate list, which can be retrieved by clicking the Schedule tab on the Ribbon Panel:



On every task you can get in-depth information, including:

- The task name
- The full path to the generated script of the task
- Scheduled time of launch
- Statistics on the last launch
- Scheduled time of the next launch
- Used account information
- Comments to the task

To easily manage tasks, the program enables to arrange them according to a certain characteristic just by clicking on the required property.

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This feature can be particularly beneficial when the Scheduled Tasks list contains too many items.

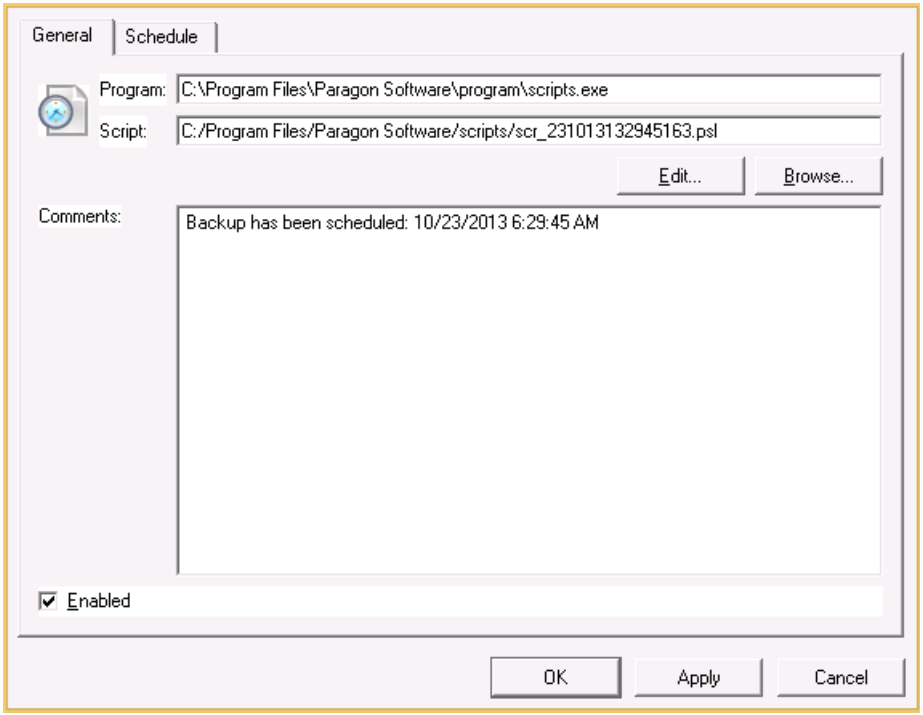
You can also enable/disable, rename, delete, refresh or modify properties of the selected task.

Task Editor

With the Task Editor you can easily modify properties of scheduled tasks. To do that, you should take the following steps:

1. Select a task on the Scheduled Tasks list.
2. Click the **Properties** button on the Scheduled Tasks list.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.



3. In the opened dialog window you can see two tabs - General and Schedule. Click the General tab to modify:
   - Full path to the macro-command program-interpreter, which describes the scheduled task;
   - Command line for starting the interpreter (i.e. the task described in macro-language)
   - Comments referring to the task
   - The option of enabling/disabling the task.

   By clicking the Schedule tab you can modify the task timetable.

In order to apply the changes, you need to click the Apply button at the foot of the dialog.

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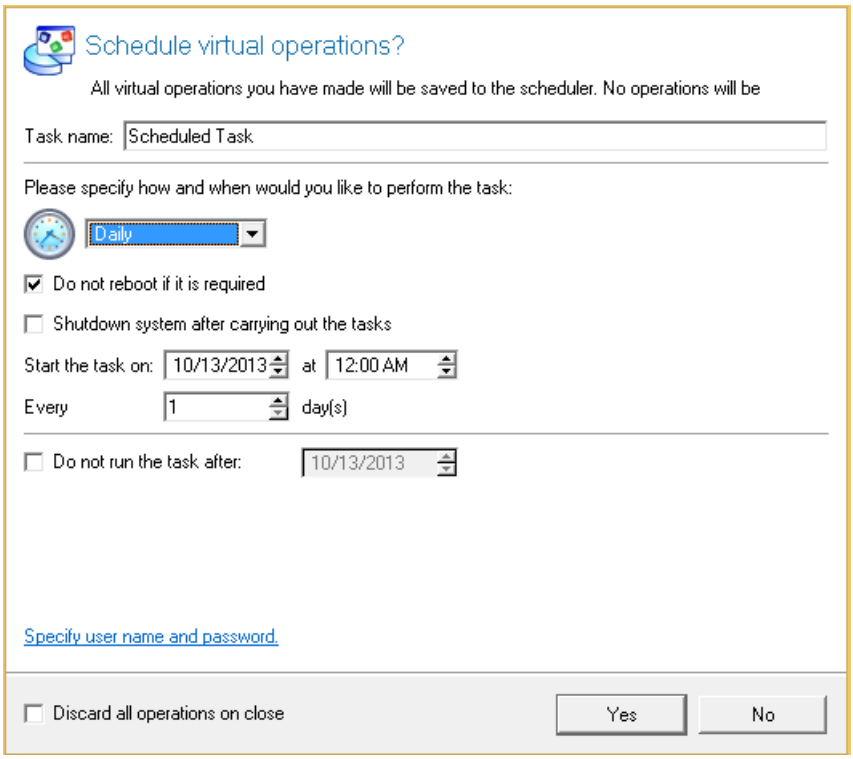
Creating a Scheduled Task

You can set a timetable for execution of any operation. For backup and copy operations the program offers handy wizards, while all the others can be scheduled with the Save to Scheduler dialog.

To create a scheduled task you should take the following steps:

1. Make sure the virtual mode of execution is enabled;
2. Carry out with the program all operations you need to schedule;
3. Call the Save to Scheduler dialog by clicking its icon on the Virtual Operations Bar;



4. In the opened dialog enter the required task name and specify the task timetable;
5. The operation will be performed immediately after confirmation.

This command is unavailable if there are no operations on the List of Pending Operations.

Extra Functionality

This chapter describes the supplementary functionality available in the program.

View Partition/Hard Disk Properties

The program enables to obtain in-depth information on the properties of hard disks and partitions. Besides the general information, such as capacity, used space or file system type it provides the possibility to get info on hard disk geometry, cluster size, exact partition location, etc.

To get properties on a partition/hard disk, please do the following:

1. Choose a partition/hard disk on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Properties…**

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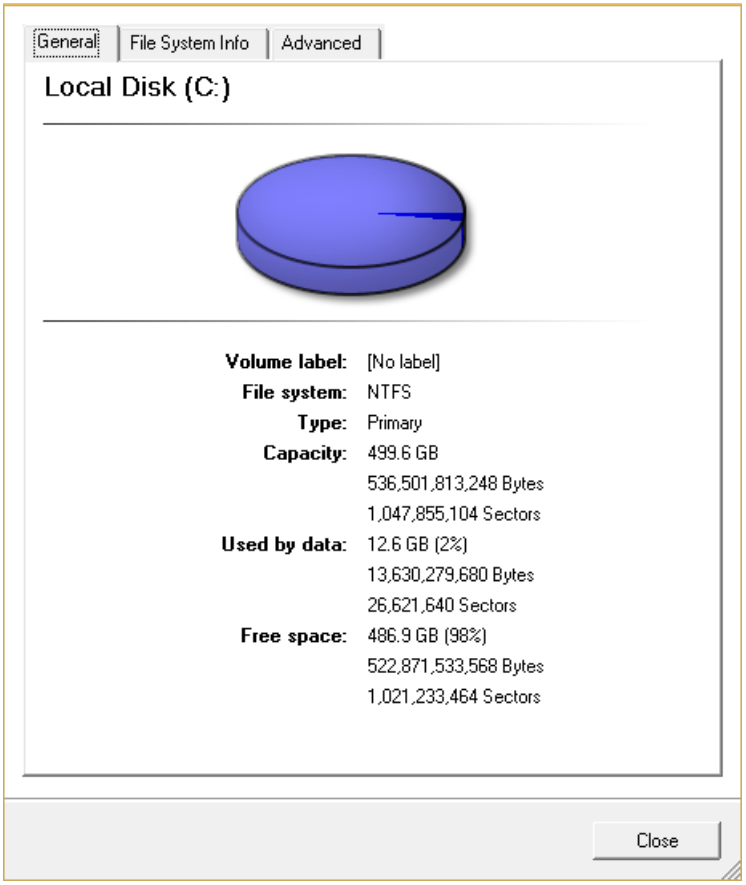
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.



In the opened dialog information will be grouped according to its properties, thus by clicking tabs you can get information you need.

Volume Explorer

Volume Explorer is a special tool to browse and export contents of the local mounted/unmounted volumes formatted to FAT16, FAT32, NTFS, Ext2FS, Ext3FS, Ext4FS, reFS file systems. Besides it enables to access Paragon backups as regular folders to explorer their contents or to retrieve certain files.

Click the **Volume Explorer** tab on the Ribbon Panel to open it:

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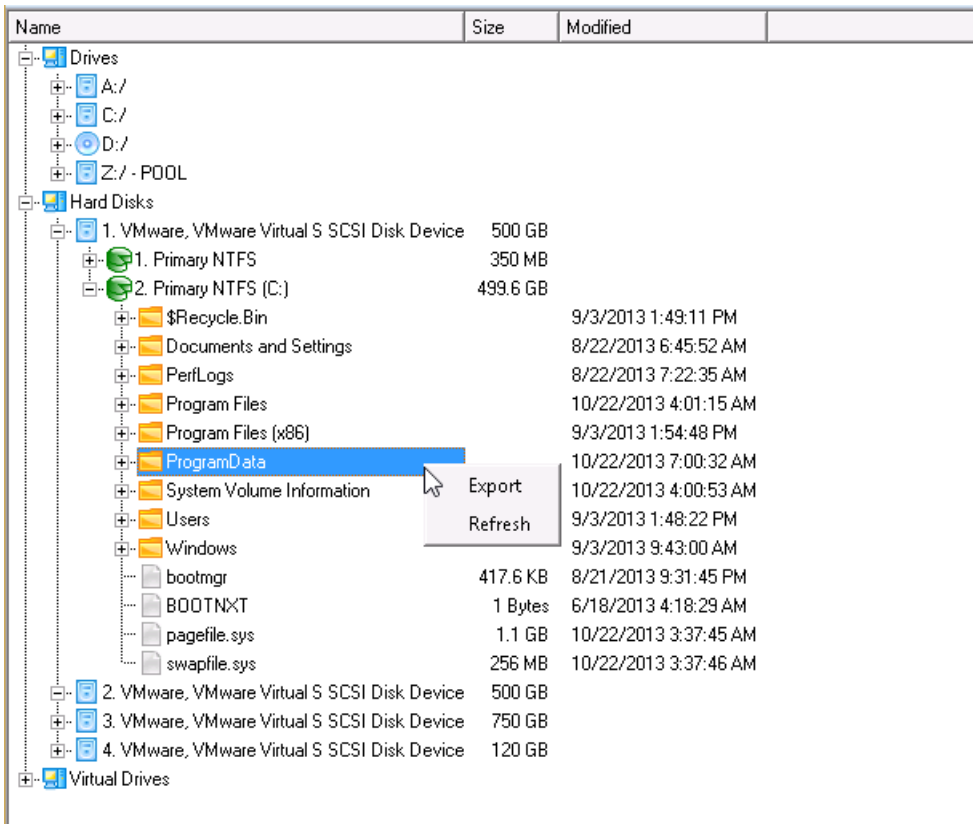
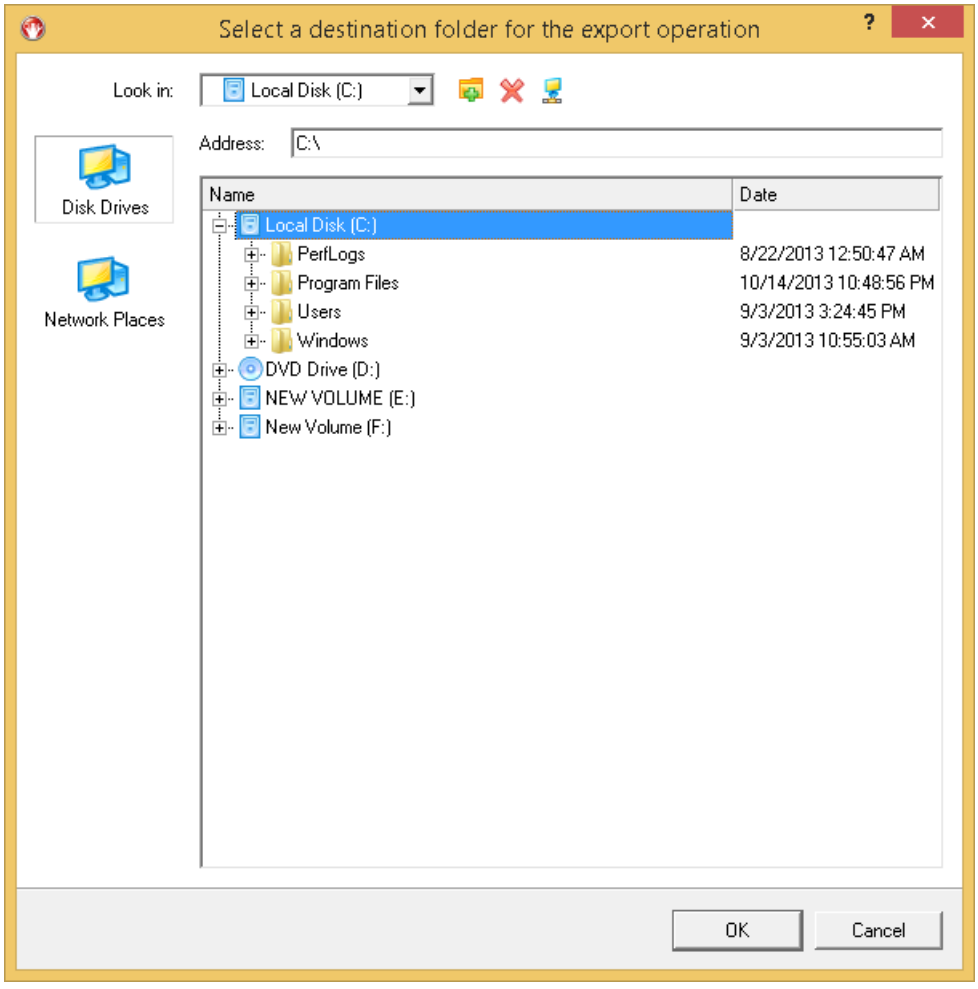


Call a context menu for the selected file/folder by the right mouse click to export it to some other location (local or network drive, etc.).



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Available operation scenarios:

- Restoring separate files and folders from a backup

The current version of the program does not enable to access virtual containers and file archives with Volume Explorer.

File Transfer Wizard

File Transfer Wizard is designed to make such operations as copying of separate files/directories or burning of them to CD/DVD as easy and convenient as possible. It may be of particular use in case of a system malfunction, caused either by a virus attack or files corruption, in order to get the system back on track again. Besides it provides access to Paragon backups as regular folders to browse through their contents or copy required files.

Startup

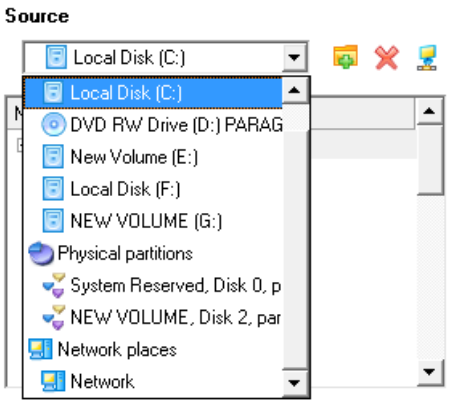
- Click **Tool Button**, then select **File Transfer Wizard**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Setup

The wizard offers the following steps to accomplish the transfer operation:

- **Place to look for files/directories**. Select a source disk from the pull-down list in the left pane of the page. The program enables to process both mounted and unmounted (without drive letter assigned) partitions. Besides it is possible to map a network drive.



- **Object(s) of operation**. Choose files/directories you want to copy and place them to Clipboard by pressing the Add button. To delete a file/directory from the Clipboard, select it in the Clipboard pane and press the Remove button. You can also create a new folder, rename or irreversibly delete existing files/directories of the left pane by pressing the appropriate buttons.

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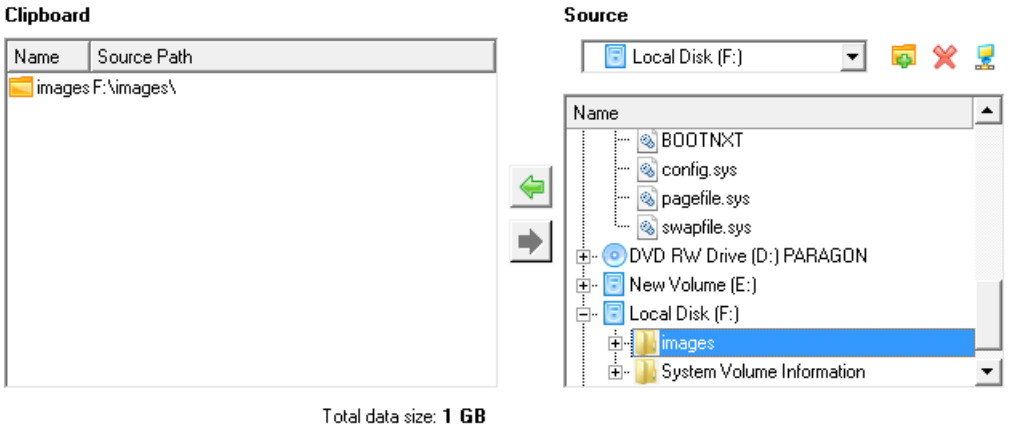
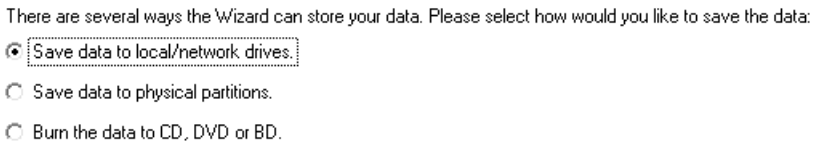
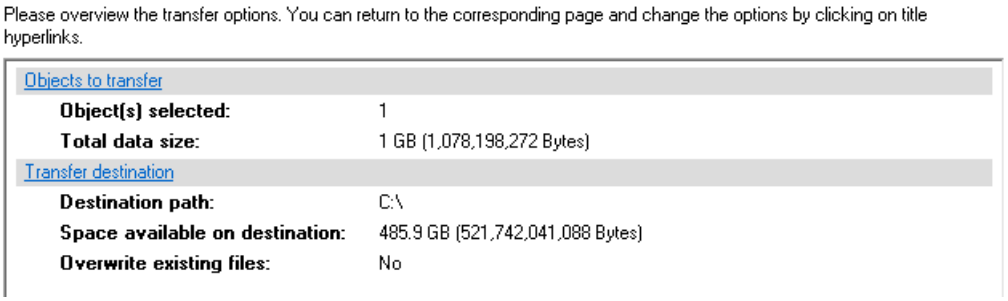


Files/directories deleted from the Clipboard remain intact on source disks.

- **Destination to store the object(s)**. The File Transfer Wizard allows copying data to local or network drives, to physical partitions (without drive letters assigned), or burning them to CD/DVDs. Choose the way the data will be stored.



- **Revision of changes**. The Transfer Summary page provides structurally divided information on all the actions made in the wizard. Check the changes and come back to any step of the wizard (if necessary) by following the required hyperlink.



Result

After the operation is completed the required data will be placed into the specified destination.

Available operation scenarios:

- Copying of data from the corrupted system disk to another hard disk
- Burning of data from the corrupted system disk to CD/DVD
- Copying of data from a backup to the corrupted system partition
- Restoring separate files and folders from a backup

Mount Partition

The program enables to assign or remove drive letters of existing formatted partitions.

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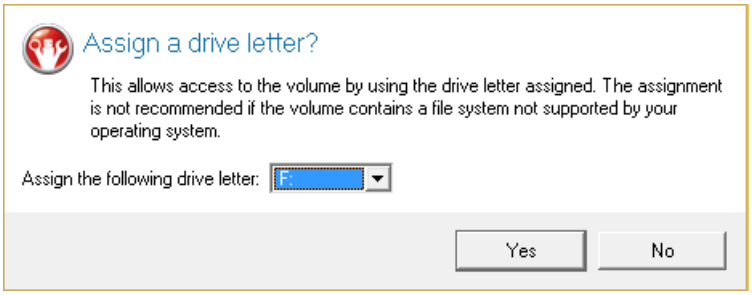
Assign Drive Letter

In order to mount a partition you should take the following steps:

1. Select a partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Assign Drive Letter…**

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. Specify a drive letter for the selected partition. Initially the program suggests some consistent value for this parameter. So you may just press the Yes button to confirm the operation.



However you can manually define the required letter by selecting it from the pull-down list of available drive letters.

4. The operation will be performed immediately after confirmation.

Remove Drive Letter

In order to un-mount a partition you should take the following steps:

1. Select a partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Remove Drive Letter**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. The operation will be performed immediately after confirmation.

Modifying drive letter of the system partition will result in inability to boot the operating system.

After having processed partitions with installed software, some programs may not run properly.

Mount Archive

The program provides the ability to assign a drive letter to a partition backup image. As a result of the operation you will get a new read-only partition in the system to easily browse through its contents and copy the required information even with the standard Windows tools.

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Assign Drive Letter

Before you start mounting backup images, please study the following limitations:

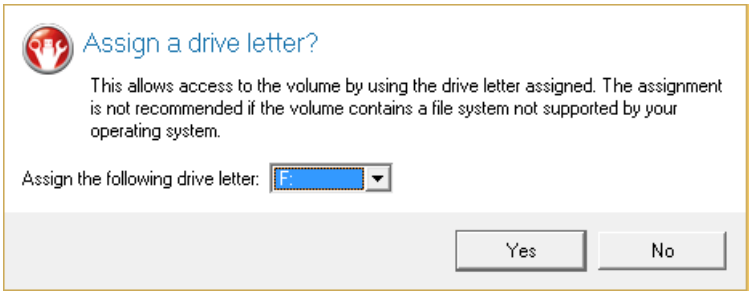
- Archives can be mounted at the partition-level only, thus please use the 'Show partitions' option to view all partitions inside backup images;
- Archives will only be mounted for the current session and won't be available after the system restart;
- Archives containing Windows Storage Spaces are not supported;
- Archives containing ReFS partitions are not supported;
- pVHD archives located on physical (unmounted) partitions or in the backup capsule cannot be mounted;
- pVHD LVM/LDM archives are not supported.

In order to mount an archive you should take the following steps:

1. Select a backup image in the Archive Database.
2. Call a context menu for the selected object by the right mouse click, then select **Mount the Selected Archive**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. Specify a drive letter for the selected backup image. Initially the program suggests some consistent value for this parameter. So you may just press the Yes button to confirm the operation.



However you can manually define the required letter by selecting it from the pull-down list of available drive letters.

4. The operation will be performed immediately after confirmation.

It is strongly recommended not to un-mount backup images with Windows Disk Manager or other third side software.

Remove Drive Letter

In order to un-mount a backup image you should take the following steps:

1. Select a backup image in the Archive Database.
2. Call a context menu for the selected object by the right mouse click, then select **Unmount the Selected Archive**.

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There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. The operation will be performed immediately after confirmation.

Test Surface

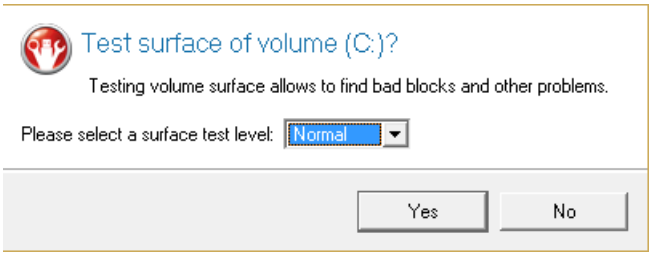
The program enables to test surface of existing partitions and blocks of free space for bad or unstable sectors. If found any it automatically marks them unusable in the file system metadata, thus minimizing the risk of data loss.

In order to start the surface test you should take the following steps:

1. Select a partition or a block of free space on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Test Surface…**

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. From the pull-down list choose the level of the surface check.



4. The operation will be performed immediately after confirmation.

Check File System Integrity

The program allows you to check integrity of a file system. It can be used to detect possible file system errors before performing any operation on a partition.

To start the system integrity check you should take the following steps:

1. Select a partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **Check File System Integrity**

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

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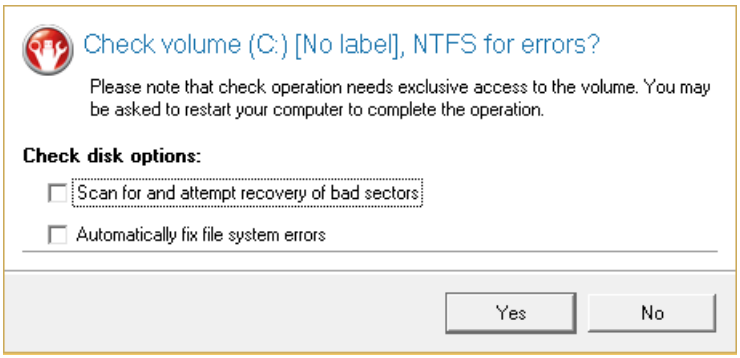


3. The operation will be performed immediately after confirmation.

Check Archive Integrity

The program provides the ability to check integrity of backup images. The function allows distinguishing between valid and corrupted images before using them. There are two wizards in the program, one for checking PBF images and one – for virtual containers (pVHD, VHD, VHDX, VMDK). The work algorithm of both wizards is very similar.

Startup

For PBF images

- Click the **Backup & Restore** tab on the Ribbon Panel, then select **Check Archive Integrity**.

For virtual containers

- Click the **New Backup Format** tab on the Ribbon Panel, then select **Check VD Integrity**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

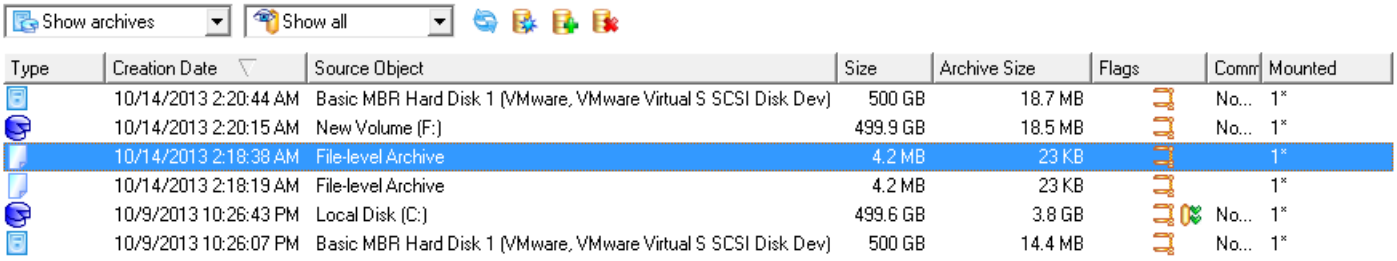
Setup

The wizard offers the following steps to accomplish the operation:

For PBF images

- **An archive to verify**. The Browse for Archive page enables to find a backup image you need.

  By clicking the Switch to Archive List View link, you can see a list of images contained in the Archive Database (if any).



  To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

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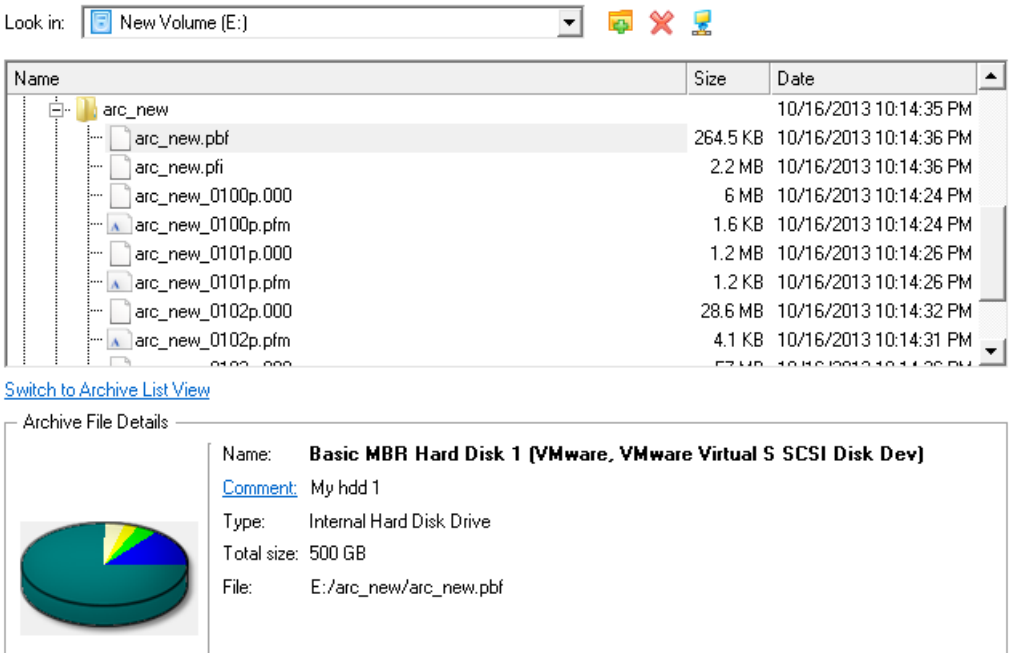
By clicking the Switch to File View link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.



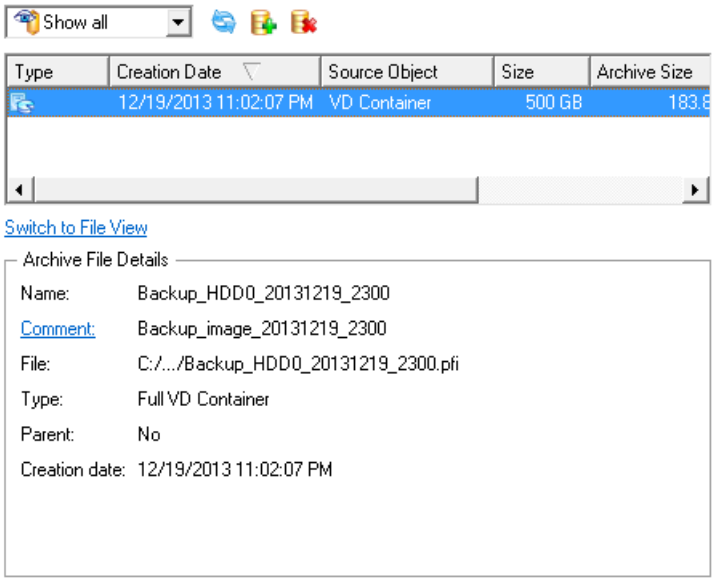
Moreover, on this page you've got the possibility to create new folders, delete existing files/folders or map network drives by clicking the appropriate buttons.

To know more on the subject, please consult the Viewing Image Properties chapter.

For virtual containers

- **An archive to verify**. The Browse for Archive page enables to find a backup image you need.

  By clicking the Switch to Archive List View link, you can see a list of images contained in the Archive Database (if any).



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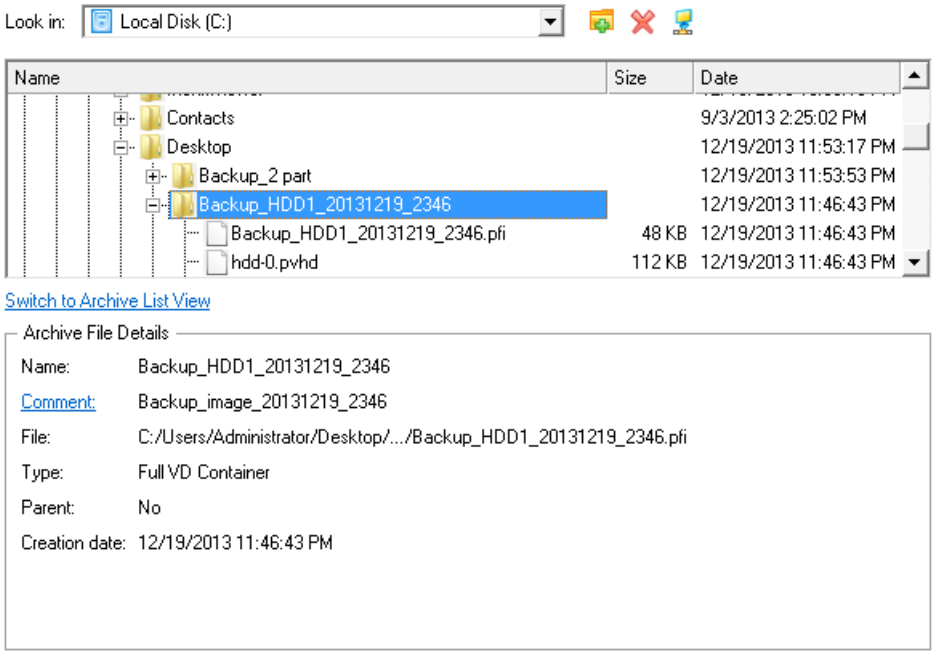
To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

By clicking the Switch to File View link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.



Moreover, on this page you've got the possibility to create new folders, delete existing files/folders or map network drives by clicking the appropriate buttons.

To know more on the subject, please consult the Viewing Image Properties chapter.

- **Revision of archive's structure**. By clicking **Next** for the selected virtual container you can see its properties in a bright graphical form. To initiate verification, please click **Next** one more time.

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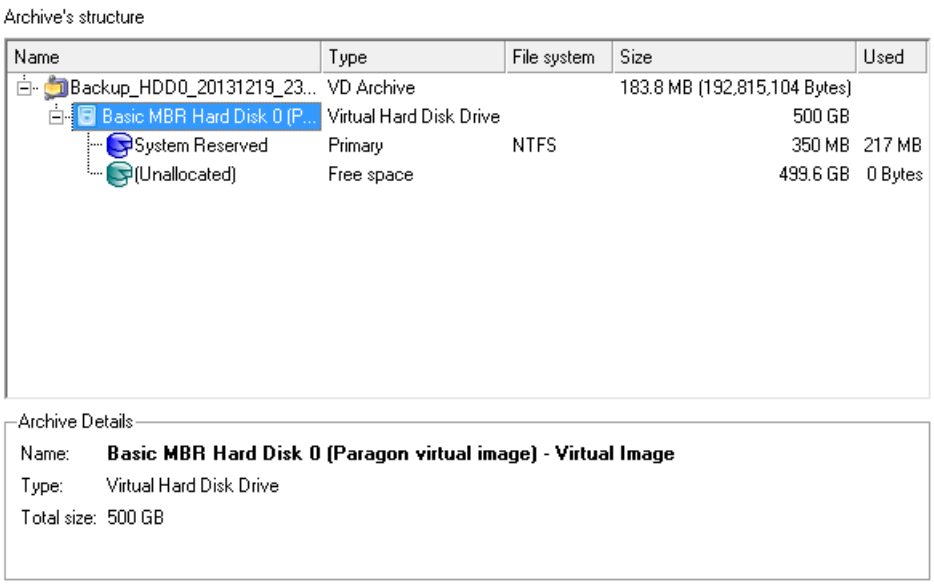

Result

After the operation is completed you can see results of the check.

Check Recovery Discs

You've got the ability to check whether backup media created with the program is 100 percent error-free and ready to use. The Check Recovery Disc Wizard will help you do that.

This function is not available for a 32-bit version of the program.

Startup

- Click **Tool Button**, then select **Check Recovery Discs…**

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Startup

The wizard offers the following steps to accomplish the operation:

- **CD/DVD drive**. Select from the pull-down list of available CD/DVD devices the required drive to use during the operation.

- Set whether to eject the disk after the operation is completed or not.

Result

After the operation is completed you can see results of the check.

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View Sectors

With the built-in View Sectors tool the program enables to view sectors on existing partitions/hard disks providing the possibility to directly access and modify sectors, save and restore sectors from specified files, navigate through the system metadata, etc.

In order to edit/view sectors of a hard disk/partition you should take the following steps:

1. Select a hard disk/partition on the Disk Map.
2. Call a context menu for the selected object by the right mouse click, then select **View Sectors**.

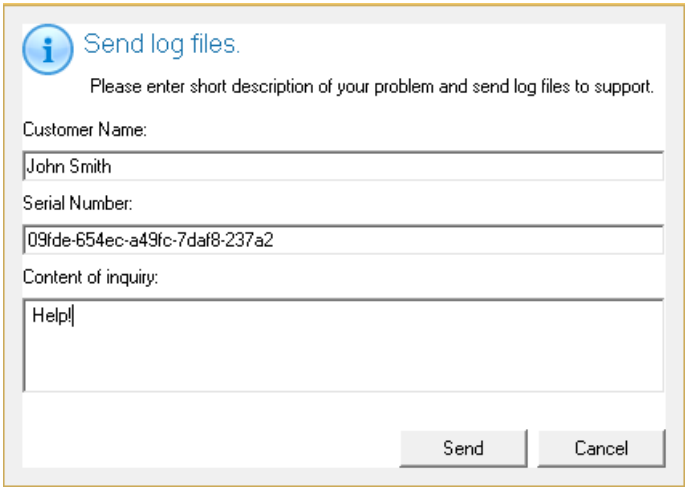
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

Send Log Files

The program enables to simplify the procedure of sending support requests to the Paragon Support Team. In case of having difficulties with handling the program, you, with the help of this very function, can address the company support engineers and provide them with all the information they need such as the disk layout, performed operations, etc. in order to tackle the encountered problem. Information of that kind is stored in Log files.

In order to send log files to the Paragon Support Team you should take the following steps:

1. Click **Tool Button**, then select **Send Log Files**;
2. Provide a customer name and a product serial number;
3. Give a detailed description on the encountered problem.



By clicking the Send button the built-in mail client will generate a template request with attached compressed log files and then send it to the Paragon Support Team.

Log files do not contain any confidential information on the operating system settings or the user documents.

The Send Log Files function is only available when outgoing mail server (SMTP) and the user e-mail address are properly set. To learn more about it please consult the Settings Overview chapter.

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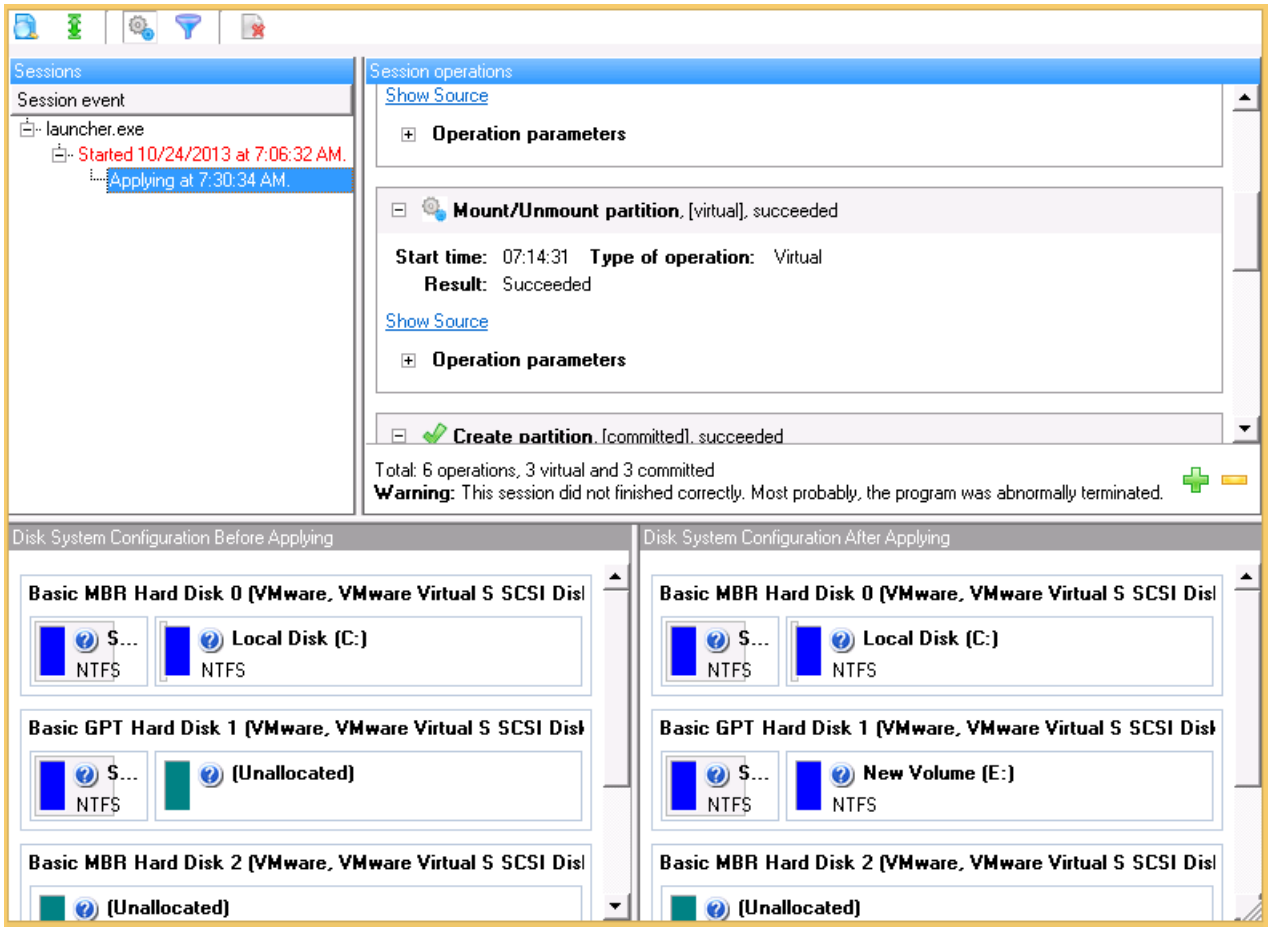
View Logs

With a handy dialog you can study logs on any operation carried by the program. To make this job as easy as possible, all the information is structurally divided, besides there is the possibility to see the disk layout before and after an operation, what is very convenient.

In order to view logs on carried out operations, click **Tool Button**, then select **View Log Files**.



Typical Scenarios

This chapter lists a number of the most frequently used scenarios that may be accomplished with the program. You can find here useful recommendations and descriptions of operations.

Backup Scenarios

Creating the Backup Capsule

1. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Manage Capsule**.
2. On the Wizard's Welcome page, click the Next button.
3. Select a place on the disk where the backup capsule will be created. It can be created as a primary partition or as a logical drive within an extended partition. It can be inserted into any place on the hard disk: at the end (preferable), at the beginning or somewhere in the middle between other partitions.

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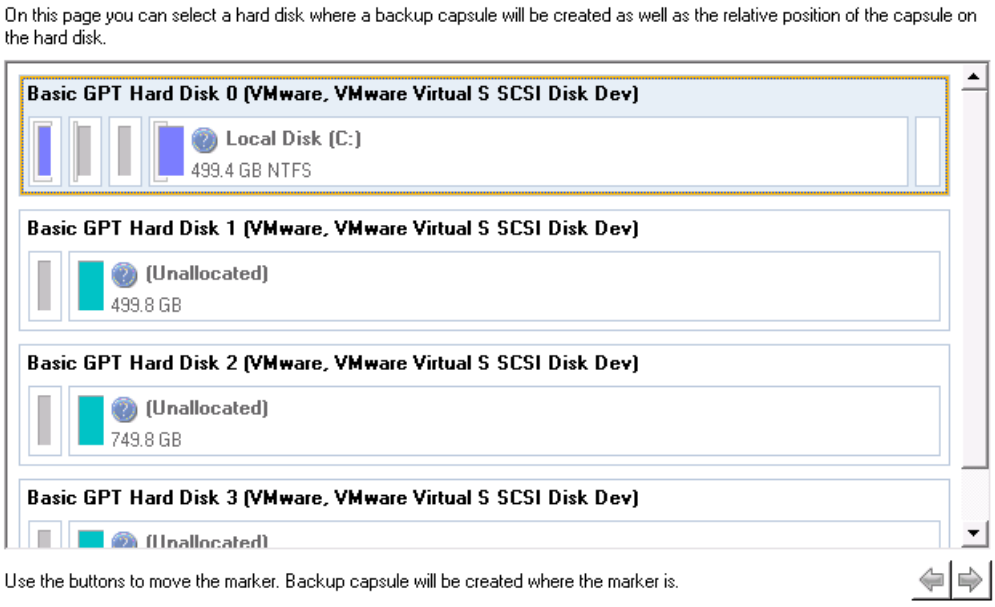
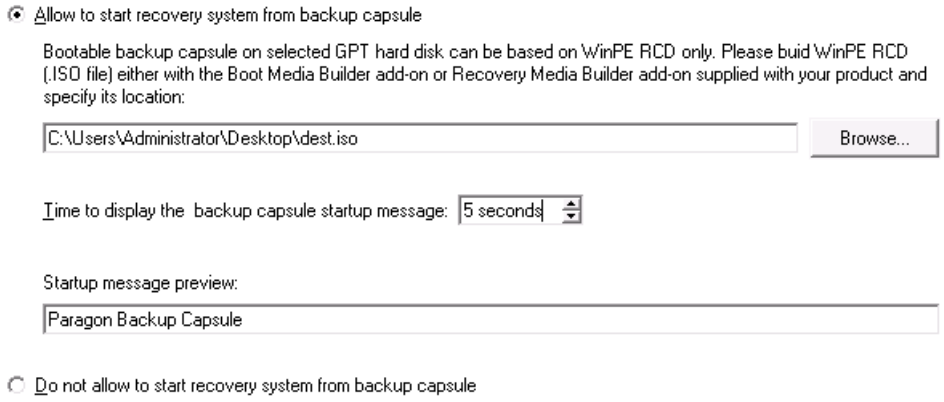


By default, the program allows the user to create the backup capsule only as the last primary or as the last logical drive within the extended partition. However, by activating the advance mode on the first page of the wizard you can remove this restriction that in its turn might result in some boot problems.

4. Activate the bootable recovery environment if needed. With its help you will get the choice to boot directly from the backup capsule for maintenance or recovery purposes every time you start up the computer.

   If you're attempting to embed our bootable environment to a GPT disk (just our case), you will be prompted to provide a path to an .ISO image of the WinPE recovery environment, which can be prepared with Paragon's Recovery Media Builder. If you have to do with an MBR disk, no preliminary actions are required, as in this case there will be used a Linux-based image, which is included to the product by default.



Creation of the bootable backup capsule on an MBR disk will result in overwriting MBR, thus in case of having a third side boot manager, it will be removed. To avoid that you can save the current MBR with the help of the Edit/View Sectors tool.

The backup capsule can only be bootable if it is located on the bootable device.

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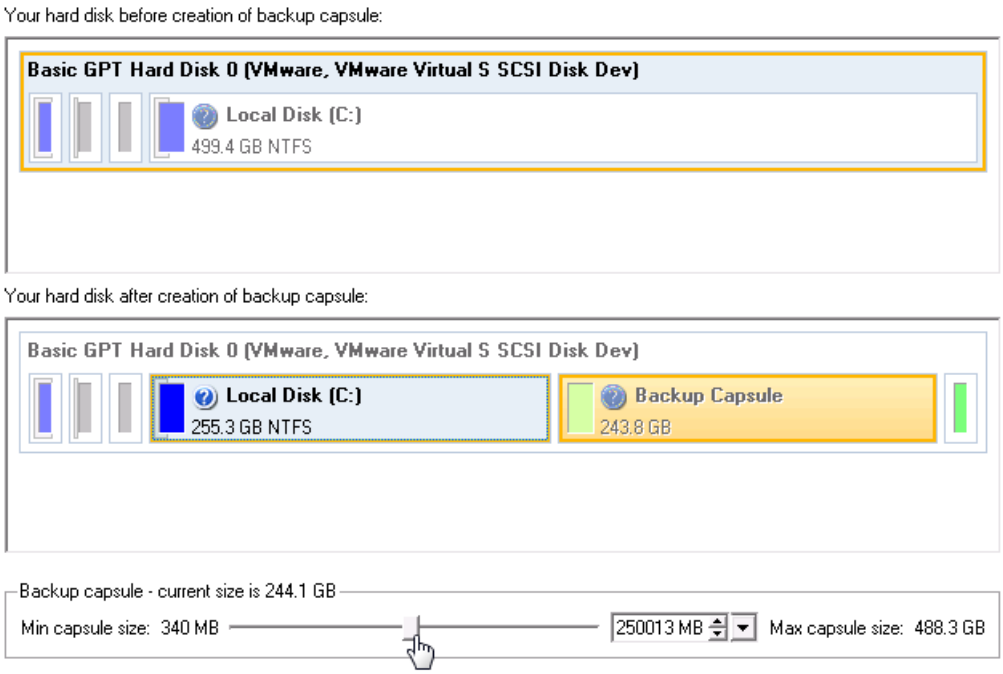
5. Preview the resulted hard disk layout and change size of the backup capsule if necessary by moving the corresponding slider or manually entering the required value. It will be created at the expense of free space of the selected disk.



There is no restriction on the size of the backup capsule, merely depending on the available space of the hard disk and the capacity needed for the backup.

If the wizard cannot find enough free space in one block, it will redistribute free space, joining all free space blocks together into one united block and moving partitions if necessary. If the total amount of free space is still not enough, it is possible to split a fragment of space from one of the existing partitions, thus resizing it.

If the partition is locked and cannot be resized, the wizard makes the system reboot to create the backup capsule and automatically boots the system again. The rebooting mechanism is different for different versions of Windows.

6. Start the operation (by clicking the Next button) or return to correct the settings.

After the operation is completed you can place backup archives into the created backup capsule.

This operation can also be accomplished with our recovery media.

New Backup Format

Backing up a hard disks or partitions to a network drive

To back up one or several hard disks or individual partitions and then place the resulted image to a network share, please do the following:

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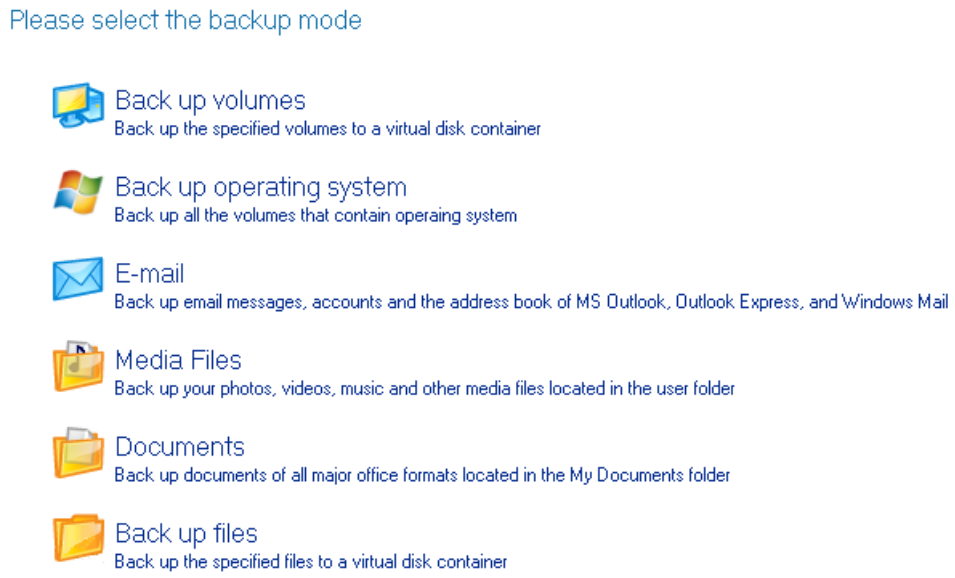
1. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Backup to VD**.

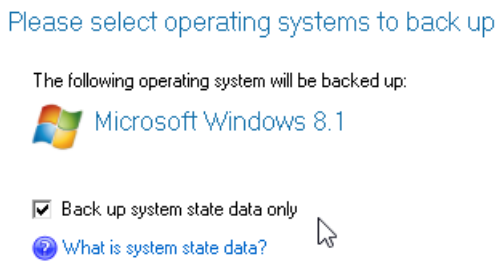
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the **Next** button.
3. Select **Back up operating system** to create a sector-level virtual container of the entire operating system. If you want to back up individual volumes, please select the **Back up volumes** option.



4. The wizard will search your system for supported operating systems. To back up the System state data without other data located on the system partition, select the **Back up system state data only** check box.

You can find more information on System State on the Microsoft website: https://technet.microsoft.com/en-us/library/cc938537.aspx.



If several OSes have been found, you will be offered to specify the one you need to back up.

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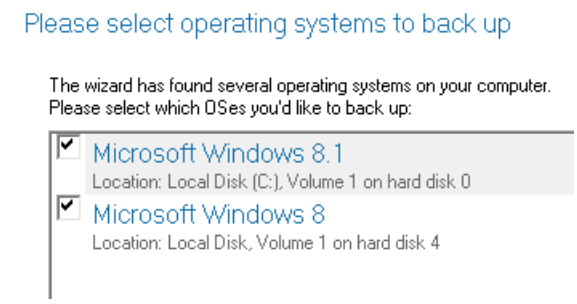
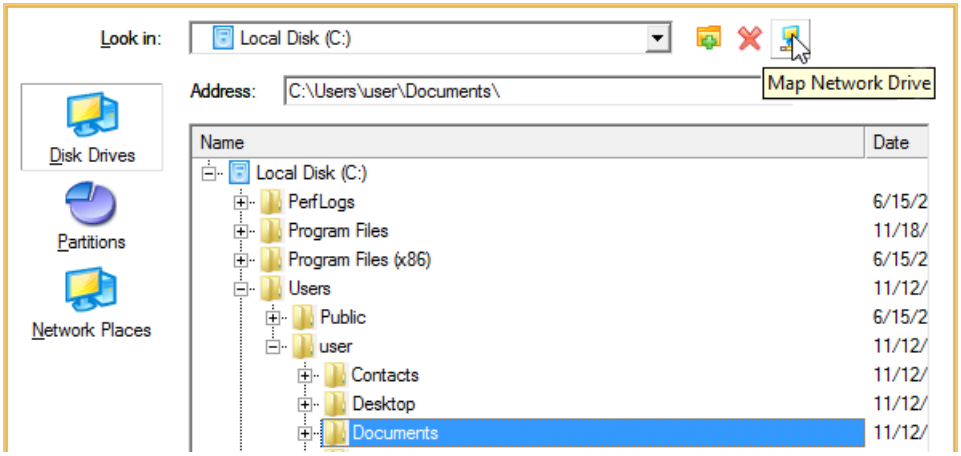


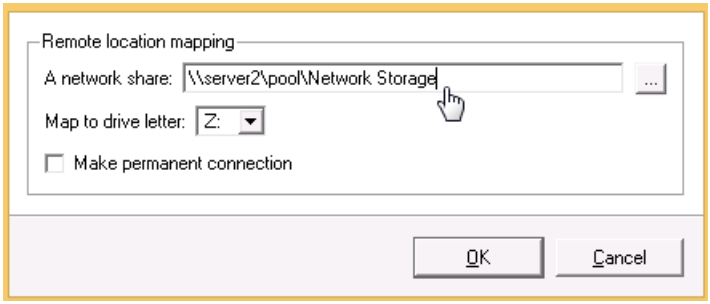
5. Specify location of the resulted image in the **Backup destination** section. If you'd like to save it locally, either enter a full path to the target folder in the corresponding field or use the **Browse** button to find it.

If you're going to save the backup image on a network share, or a physical partition (a partition that doesn't have a drive letter in the system), click on the **Browse** button. In the opened dialog you can see several options:



- Select **Disk Drives** to use a local disk as backup destination;
- Select **Partitions** to use a physical partition as backup destination;
- Select **Network Places** to use a network place as backup destination;
- Click on the **Map Network Drive** icon to map a network share to use it as backup destination (our case).

6. To map a network share, please do the following:



- Click the standard browse button [...] to browse for the required network share or manually enter a path to it;
- Define a letter from the pull-down list of available drive letters;

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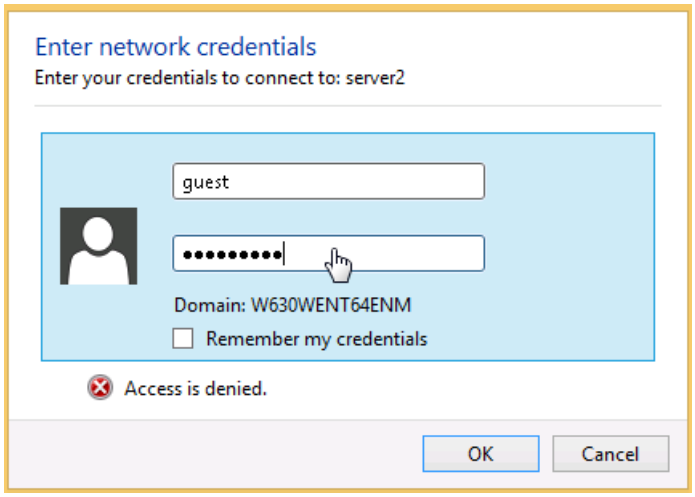
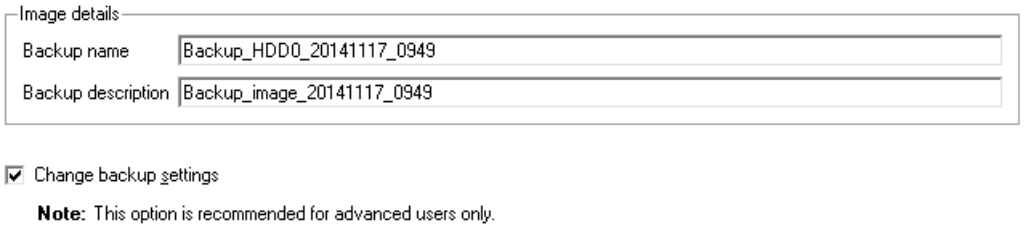
- Mark the checkbox to make this connection permanent. Otherwise it will only be available for the current Windows session;
- Specify a user name and password to access the selected network share if necessary.



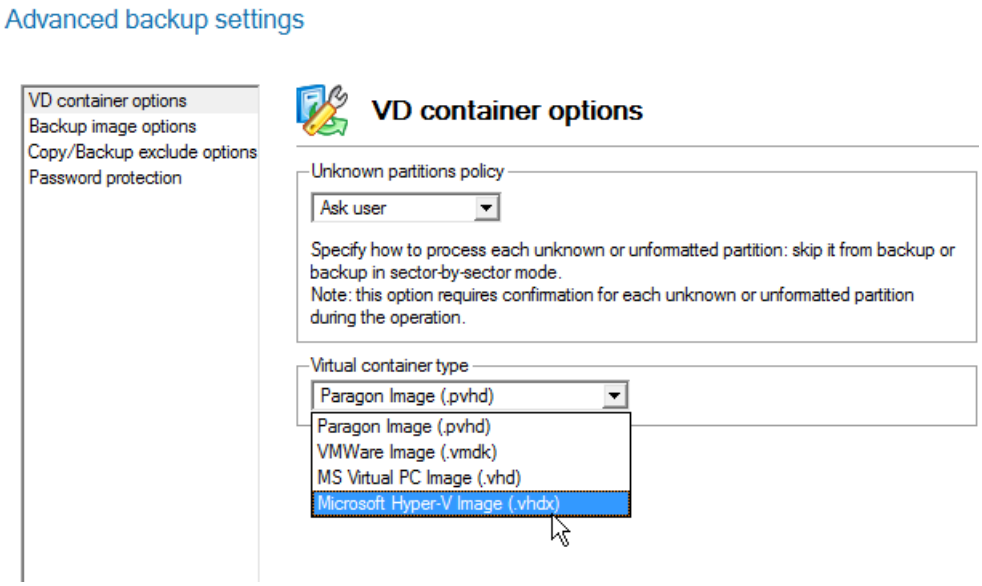
- Click **OK** when ready.

7. Edit the default archive name and description in the **Image details** section if necessary.



By default the wizard is configured to back up to pVHD (Paragon Virtual Hard Drive). If you'd like to switch the resulted virtual container to VHD, VHDX, or VMDK, additionally mark the **Change backup settings** option. Click **Next** to proceed.

8. Select the required container type from the list and specify other advanced parameters if necessary. Please consult the Settings Overview section for more information. Click **Next** to proceed.



9. Choose whether to execute the operation immediately after finishing the wizard and applying the pending changes (only if the virtual mode is enabled) or generate a script file to execute it later.

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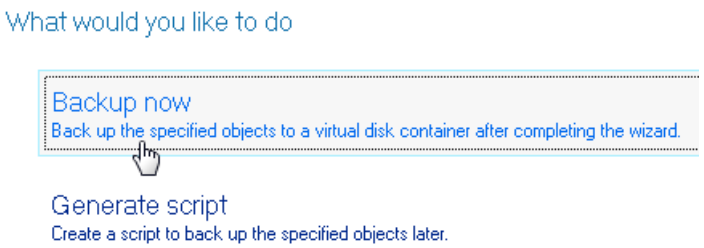


10. Click **Finish** to complete the wizard, then apply the pending changes.

This operation can also be accomplished with our recovery media.

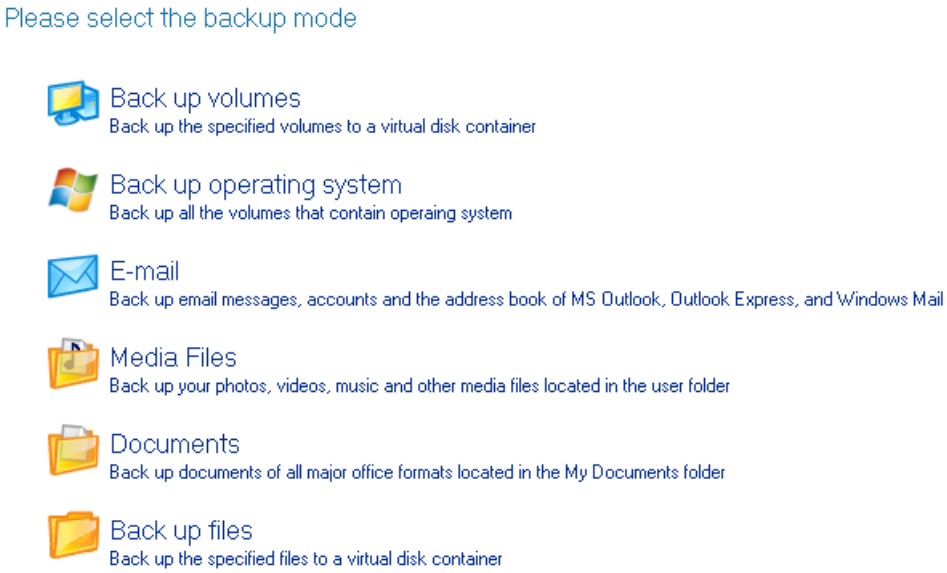
Backing up individual files and folders

To back up required files or folders to a virtual container, please do the following:

1. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Backup to VD**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the **Next** button.
3. Select **Back up files** to create a file-level virtual container. Please note that this mode won't help you to restore an operating system. If you want to back up an email database, address book, media files, or office documents, please select an appropriate option.



4. On the next page you can see a list of all partitions (both mounted and unmounted) available in the system. Mark a checkbox opposite a file, folder or even a whole partition to build up contents of the future backup image.

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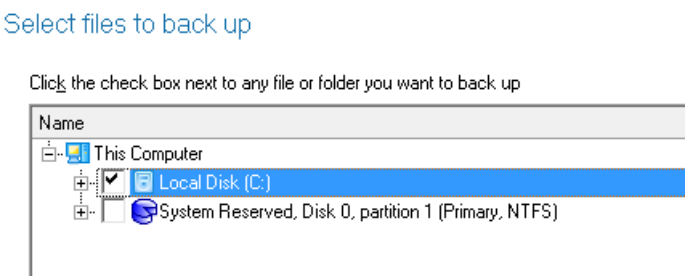
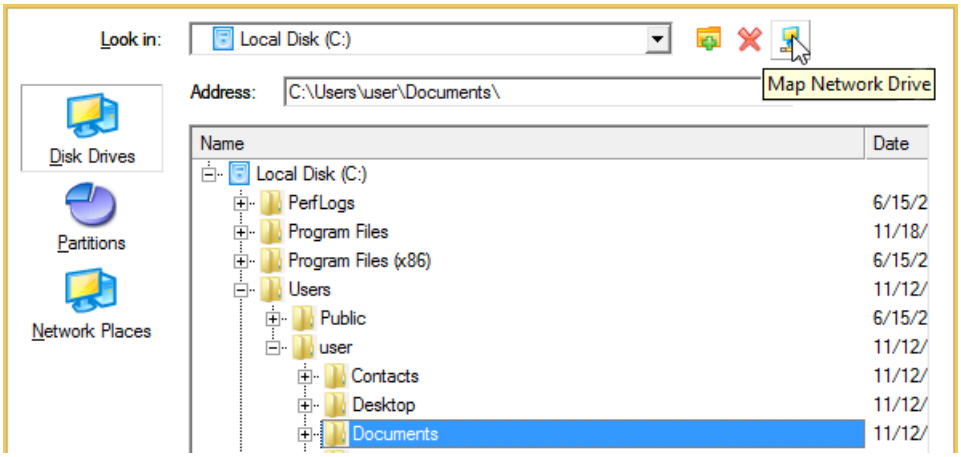


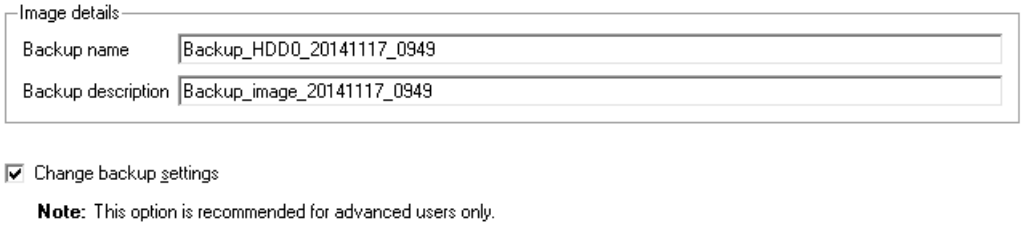
5. Specify location of the resulted image in the **Backup destination** section. If you'd like to save it locally, either enter a full path to the target folder in the corresponding field or use the **Browse** button to find it.

If you're going to save the backup image on a network share, or a physical partition (a partition that doesn't have a drive letter in the system), click on the **Browse** button. In the opened dialog you can see several options:



- Select **Disk Drives** to use a local disk as backup destination;
- Select **Partitions** to use a physical partition as backup destination;
- Select **Network Places** to use a network place as backup destination;
- Click on the **Map Network Drive** icon to map a network share to use it as backup destination (our case).

6. Edit the default archive name and description in the **Image details** section if necessary.



By default the wizard is configured to back up to pVHD (Paragon Virtual Hard Drive). If you'd like to switch the resulted virtual container to VHD, VHDX, or VMDK, additionally mark the **Change backup settings** option.

7. Select the required container type from the list and specify other advanced parameters if necessary. Please consult the Settings Overview section for more information. Click **Next** to proceed.

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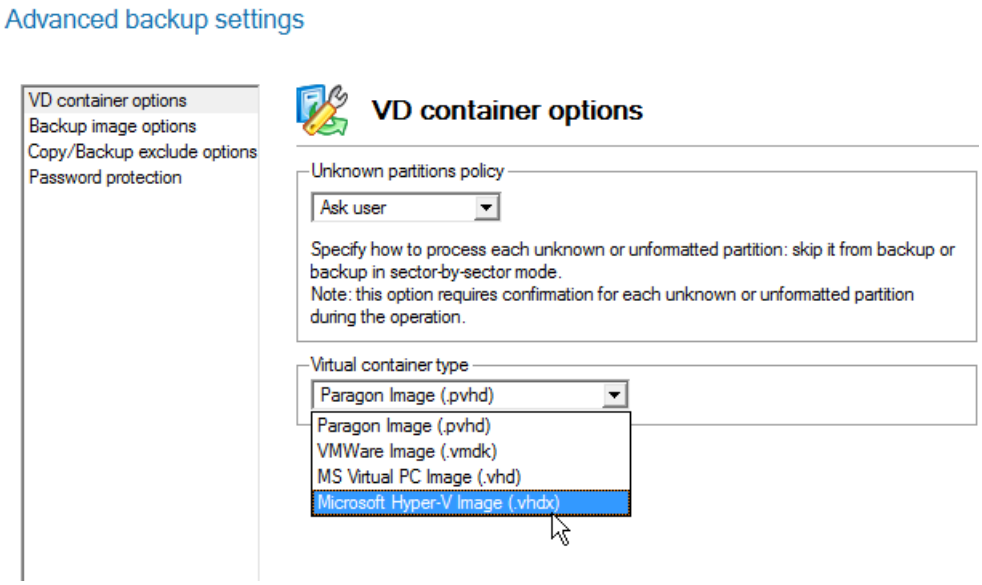
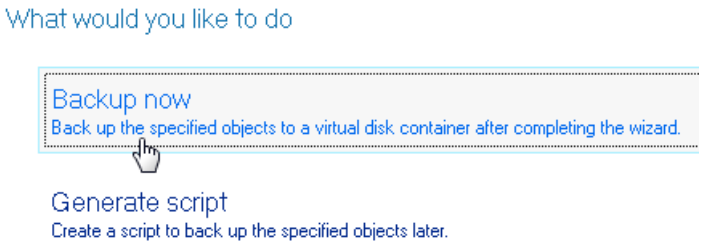


8. Choose whether to execute the operation immediately after finishing the wizard and applying the pending changes (only if the virtual mode is enabled) or generate a script file to execute it later.



9. Click **Finish** to complete the wizard, then apply the pending changes.

This operation can also be accomplished with our recovery media.

Creating an incremental update to a virtual container

You're allowed to do several incremental chains based on one full virtual container. If selecting a sector-level container, the wizard will generate a sector-level incremental image, if having to do with a file-level container – a file-level increment will be created.

To update a virtual container, please do the following:

1. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Incremental Backup to VD**.
2. On the Wizard's Welcome page, click the Next button.
3. On the Browse for Archive page, specify the required full (base) virtual container:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).

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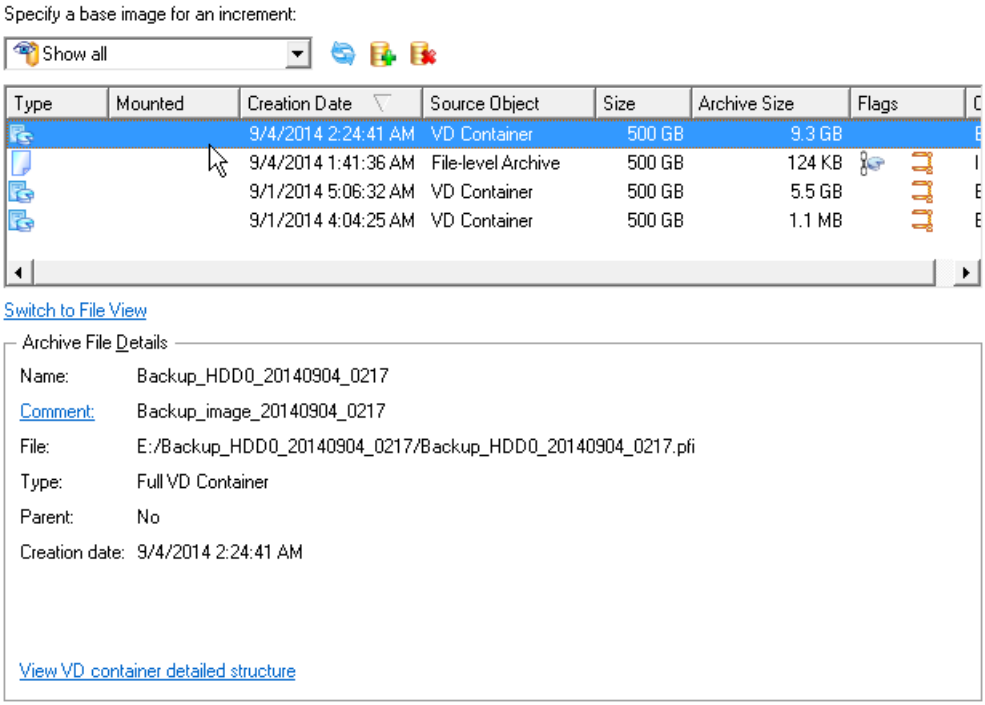
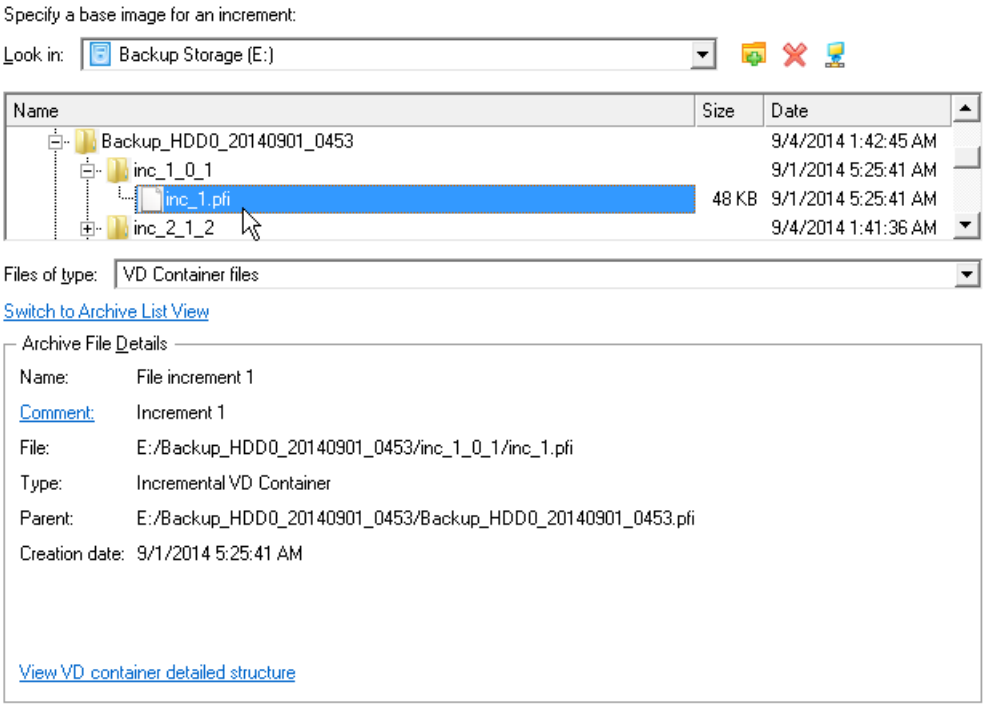


To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

- By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.



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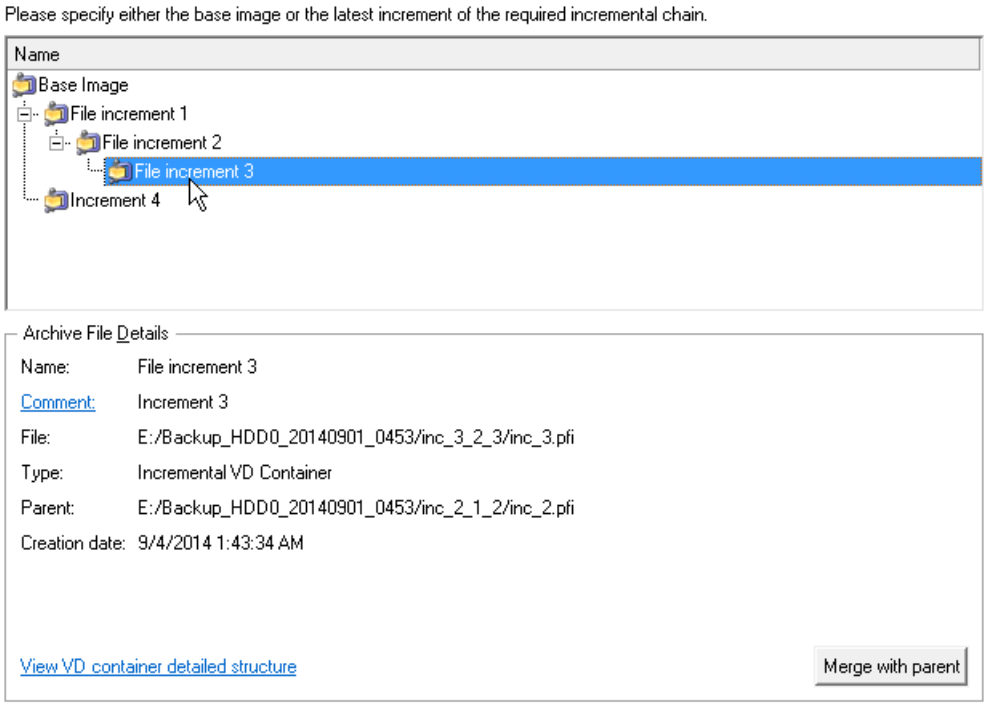
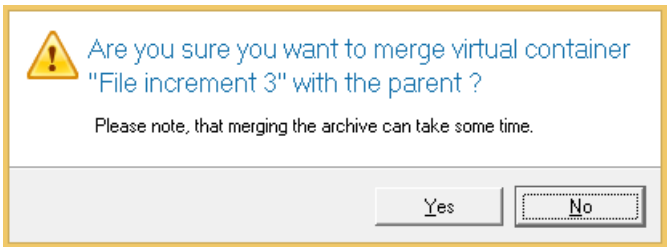
To know more on the subject, please consult the Viewing Image Properties chapter.

Our product enables to create several incremental chains to one base image, provided each chain contains changed data of a particular backup object(s). This option allows much flexibility in managing backup contents. In the wizard incremental chains will be automatically associated with their base image.



You're allowed to merge contents of the last increment in the chain with the previous one, thus updating its contents. To do that, please select the required last increment, click the **Merge with parent** button, then confirm the operation. The merge operation will be accomplished once you confirm it.



The merge operation can only be accomplished if both participants (the last increment and its parent) are unmounted. Otherwise you'll get a corresponding warning.

If you've got one increment in the chain, the merge operation will result in update of the base image, provided there's only one incremental chain from it. Otherwise, the merge operation will be unavailable.

4. The Archive Content page displays detailed information about the contents of the archive.

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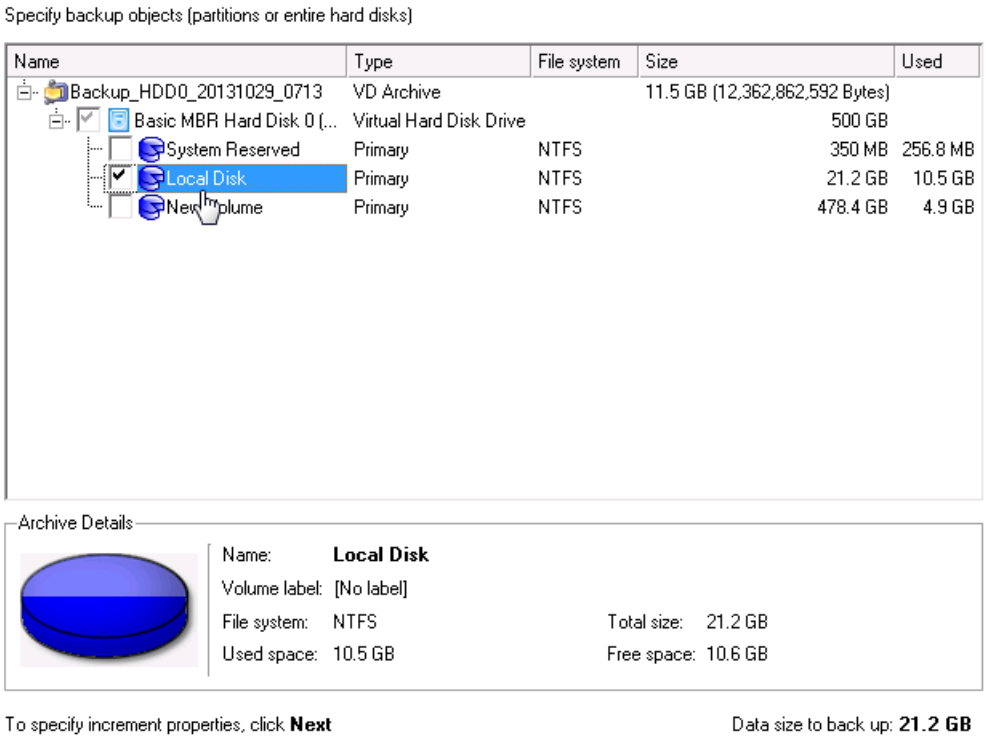
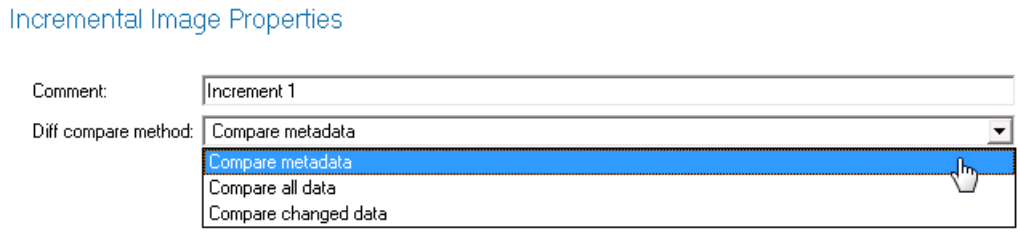


Advanced backup settings are unavailable for this type of backup.

5. Edit the default description to the created incremental image if necessary. Specify the required method of acquiring information on changed data:



- **Compare metadata** (default). At first file system metadata on each source and backup volume will be analyzed. As a result there will be built pairs of directory trees. If having to do with NTFS, directory trees will be built directly on MFT, skipping the file system analysis. Next action will be comparison of file attributes (e.g. creation/modification date) inside directory trees of the source and backup volumes to:
  - Copy all file clusters with changed attributes;
  - Copy all file clusters with changed location of cluster chains;
  - Copy all clusters of new files;
  - Copy all sectors with metadata, for instance all copies of directories and MFT for NTFS. Depending on a file system and its occupation, a full metadata copy can take up to several hundreds of megabytes.

  This method is the fastest of all three, but increments will also be the largest.
- **Compare all data**. At first there will be created a list of all occupied cluster chains. After comparison with the backup contents, all changed clusters will be copied. This method is slower, but more space saving than

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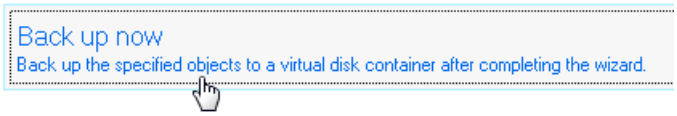
the first one. Please note however that if an increment has been done after defragmentation, plenty of redundant data might fall into it, as during the defragmentation process data is being moved, but not changed.

- **Compare changed data**. It's a combination of the mentioned above methods. After detection of new/changed files, there will be created a list of clusters to copy. During the copying, clusters on source and backup volumes will be compared in order to copy only changed clusters and clusters of new files, as well as clusters of changed file system metadata (not all metadata). This method is the slowest of all three, but it can guarantee increments will only contain changed/new data.

6. Choose whether to execute the operation immediately after finishing the wizard and applying the pending changes (only if the virtual mode is enabled).



7. Click **Finish** to complete the wizard, then apply the pending changes.

After the operation is completed you receive an incremental update to the selected backup image, placed next to the base image.

This operation can also be accomplished with our recovery media.

Creating a file complement to a sector-level container

To update only files you need since the last full virtual container, please do the following:

1. Click the **Backup & Restore** tab on the Ribbon Panel, then select **File Complement to VD**.
2. On the Wizard's Welcome page, click the Next button.
3. Specify the required full (base) virtual container:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).

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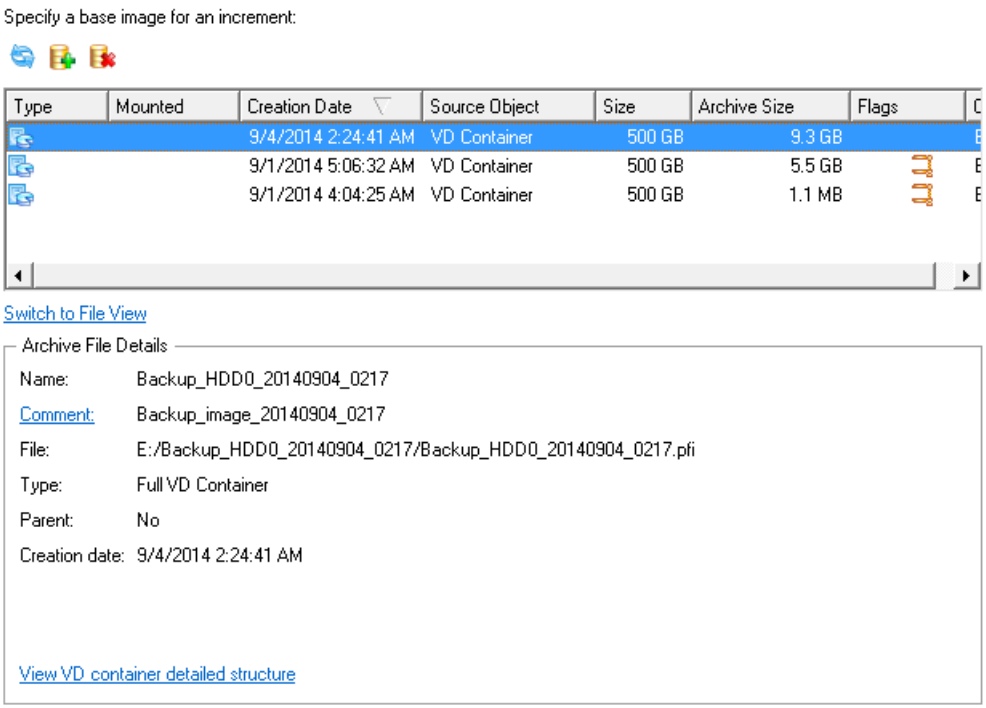
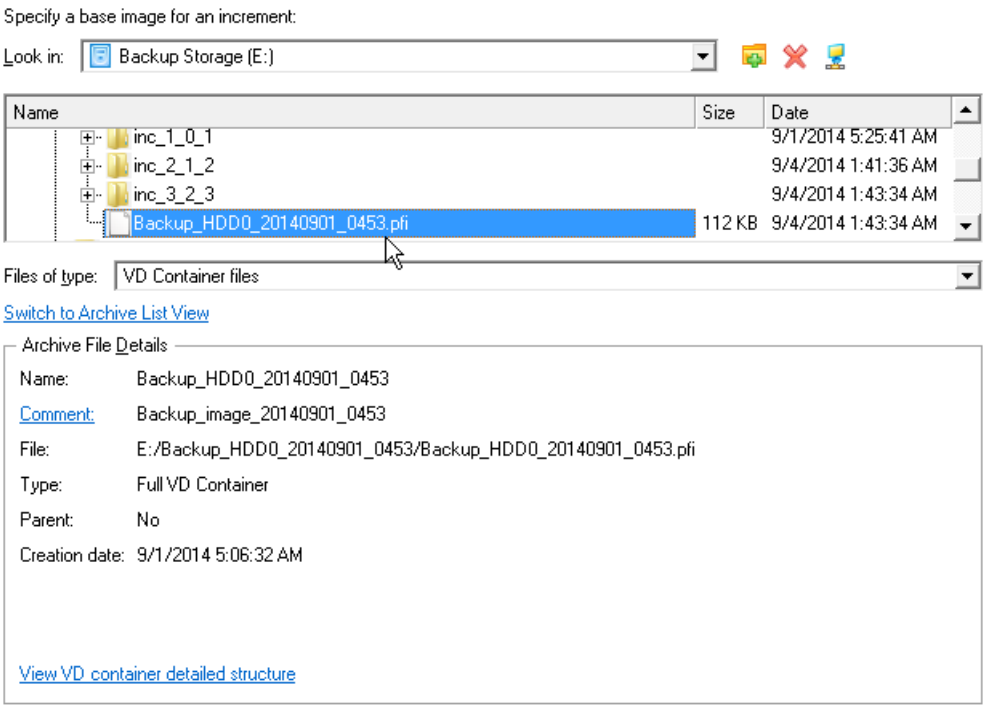


To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

- By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.



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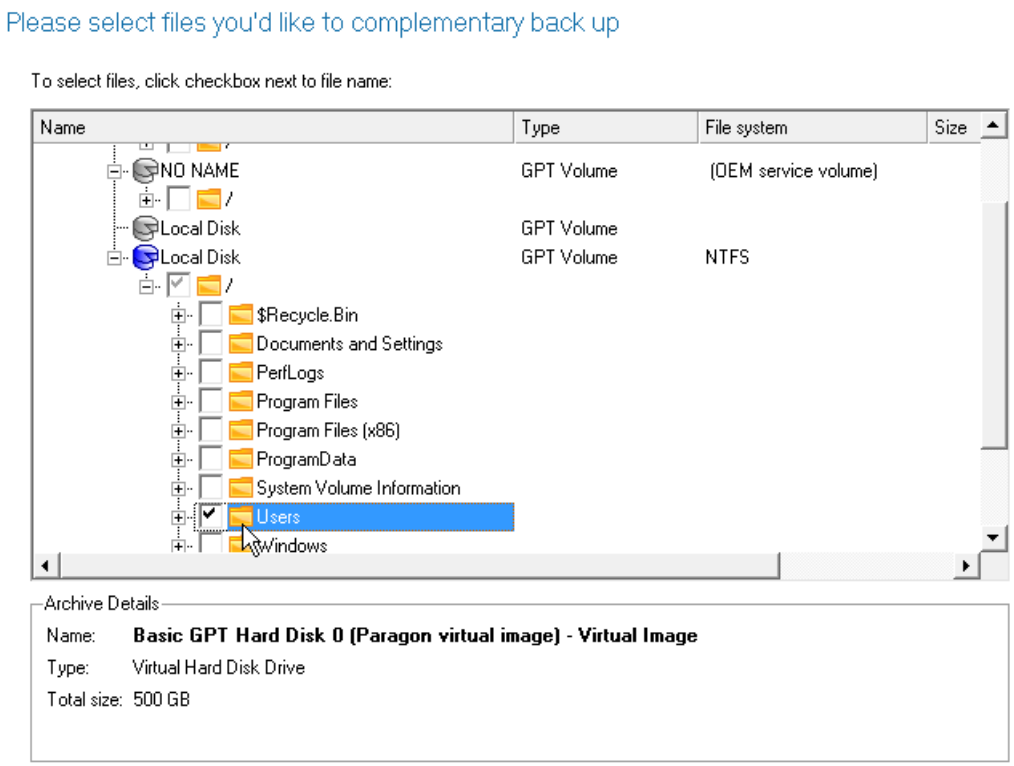
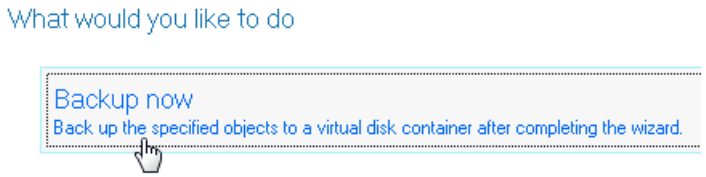
To know more on the subject, please consult the Viewing Image Properties chapter.

4. On the next page you can see contents of the selected virtual container. Mark a checkbox opposite a file or folder to build up contents of the future incremental image.



5. Edit the default description to the created incremental image if necessary.

6. Choose whether to execute the operation immediately after finishing the wizard and applying the pending changes (only if the virtual mode is enabled).



7. Click **Finish** to complete the wizard, then apply the pending changes.

This operation can also be accomplished with our recovery media.

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Legacy Backup Format

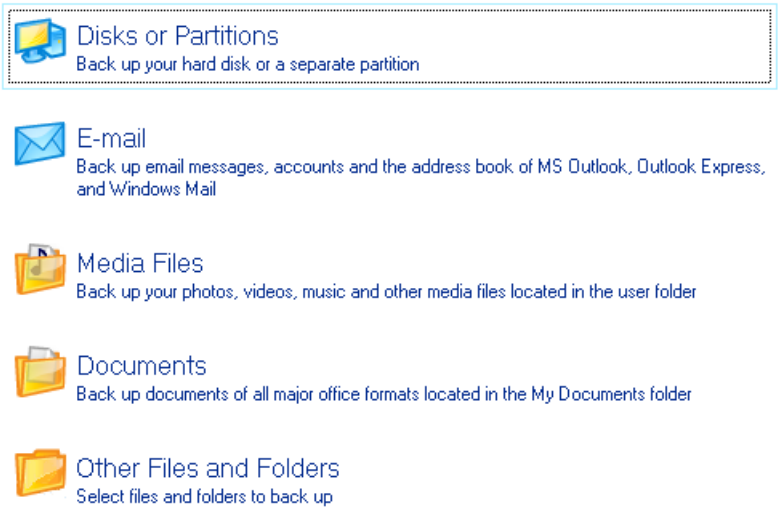
Backing up a hard disk or partition to the Backup Capsule

To back up an entire hard disk or a separate partition and then place the resulted image into the backup capsule, please do the following:

1. Create the backup capsule with the Manage Backup Capsule Wizard.
2. Enable the Legacy features view.
3. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Smart Backup**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

4. On the Wizard's Welcome page, click the Next button.
5. On the What to back up page, select **Disk or Partitions** to create a sector-based backup of the whole disk system, or only separate partitions.



6. On the next page, mark the appropriate option opposite a hard disk's name or a partition's name depending on the chosen task.

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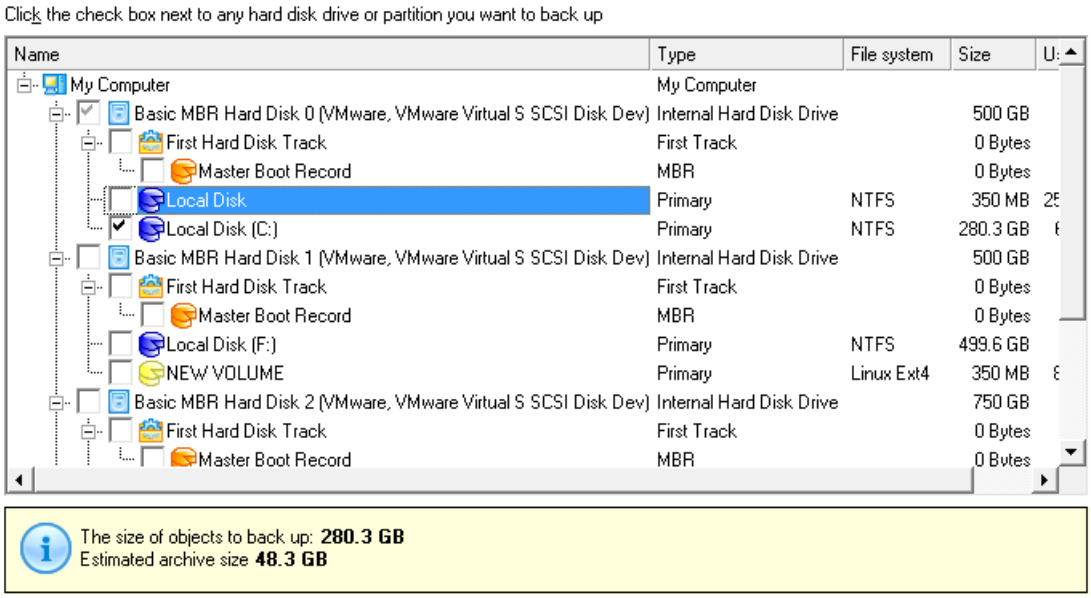
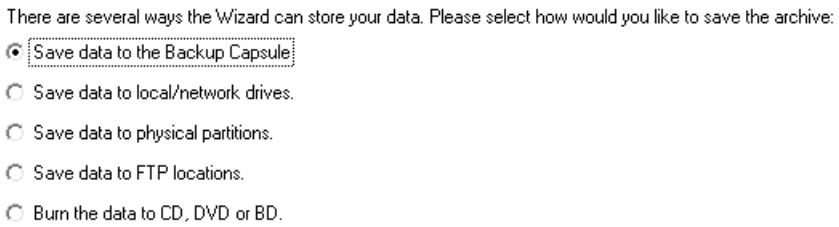


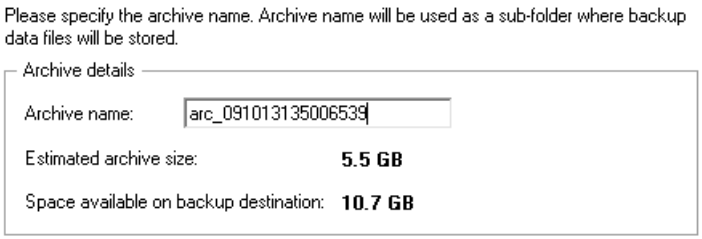
You've got the option to modify the default backup settings by marking the appropriate checkbox on this page.

By default the program will take into account exclude filters set in the Settings dialog.

7. On the Backup Destination page, select the **Save data to the Backup Capsule** option.



8. Edit the archive name if necessary.



Please take into account values of the parameters Estimated archive size and Space available on backup destination - if the archive size exceeds the available space, delete outdated backups from the Backup Capsule or resize it with the Manage Backup Capsule Wizard.

9. Add comments to your backup describing its contents.

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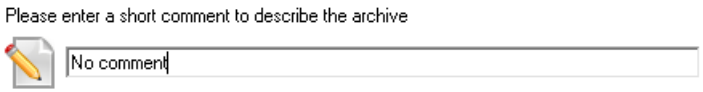


10. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

This operation can also be accomplished with our recovery media.

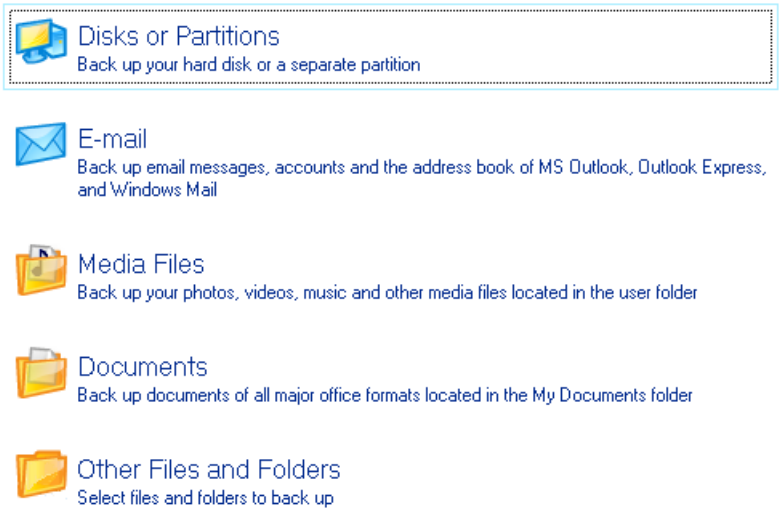
Backing up a hard disk or partition to external media (CD/DVD)

To back up an entire hard disk or a separate partition and then burn the resulted image to CD/DVD, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Smart Backup**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. On the Wizard's Welcome page, click the Next button.
4. On the What to back up page, select **Disk or Partitions** to create a sector-based backup of the whole disk system, or only separate partitions.



5. On the next page, mark the appropriate option opposite a hard disk's name or a partition's name depending on the chosen task.

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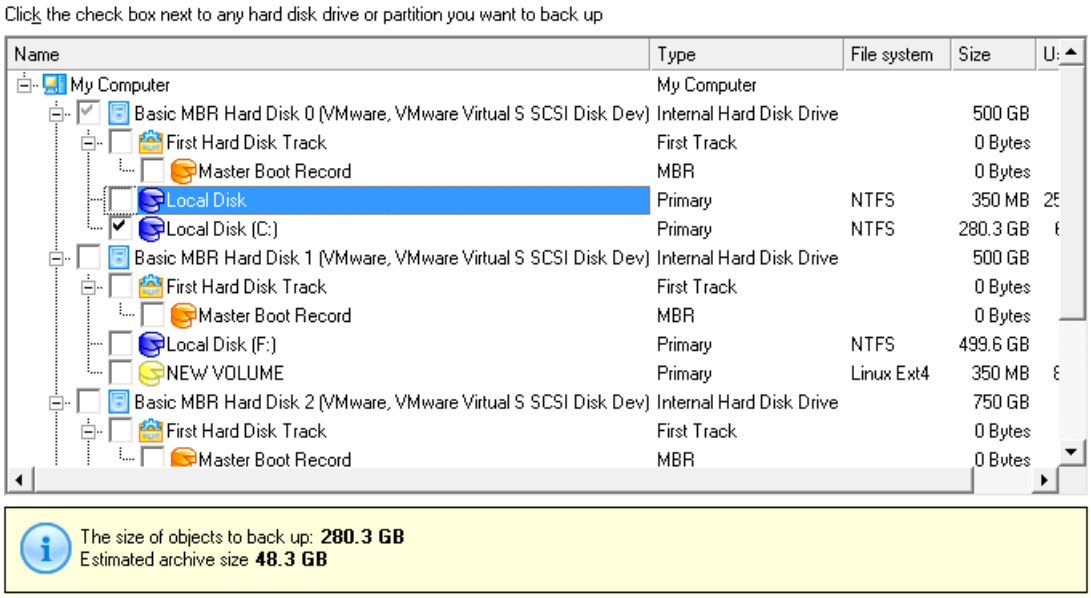
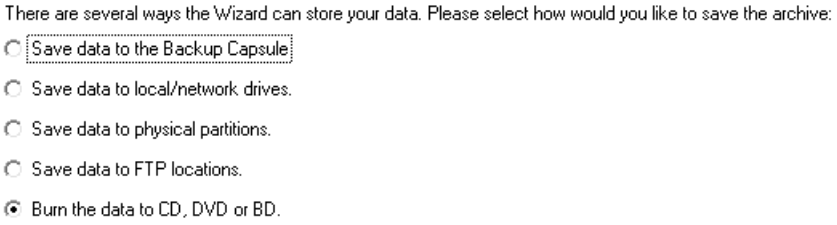


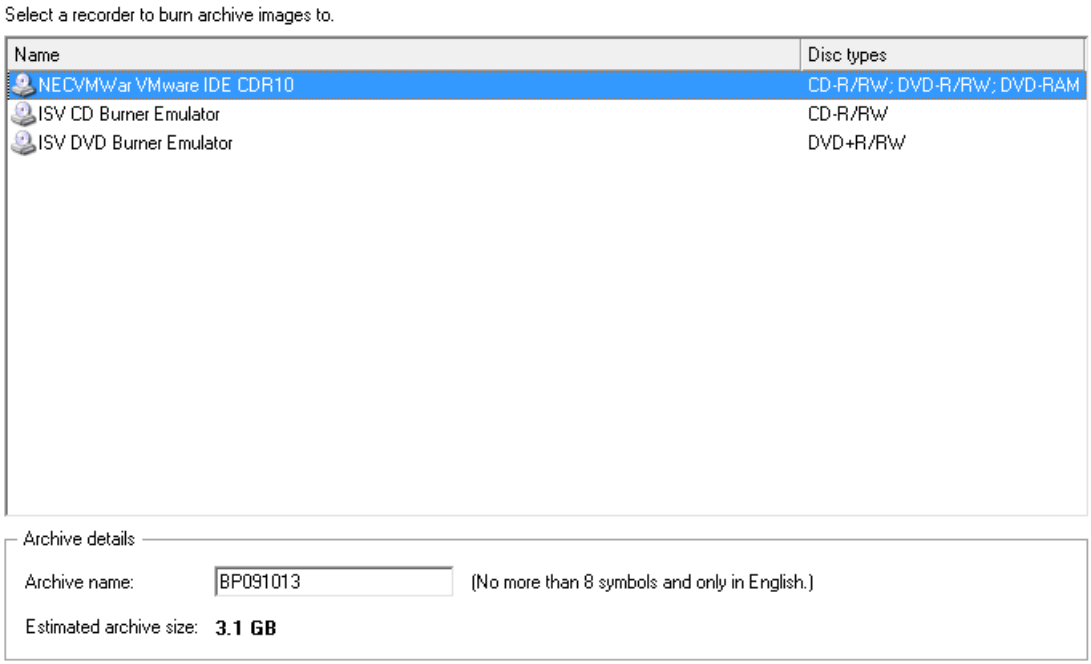
You've got the option to modify the default backup settings by marking the appropriate checkbox on this page.

By default the program will take into account exclude filters set in the Settings dialog.

6. On the Backup Destination page, select the **Burn the data to CD or DVD** option.



7. Select a recordable device on the list of available CD/DVD devices and edit the archive name, if necessary.



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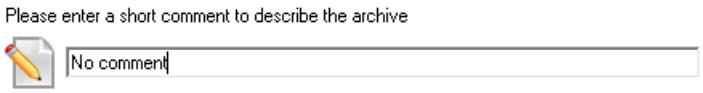
Please take into account the Estimated archive size value. It can give you a hint about the number of CD/DVD discs required for the operation.

8. Add comments to your backup describing its contents.



9. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

This operation can also be accomplished with our recovery media.

Backing up a hard disk or partition to a network drive

To back up an entire hard disk or a separate partition and then place the resulted image to a network share, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Smart Backup**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. On the Wizard's Welcome page, click the Next button.
4. On the What to back up page, select **Disk or Partitions** to create a sector-based backup of the whole disk system, or only separate partitions.

5. On the next page, mark the appropriate option opposite a hard disk's name or a partition's name depending on the chosen task.

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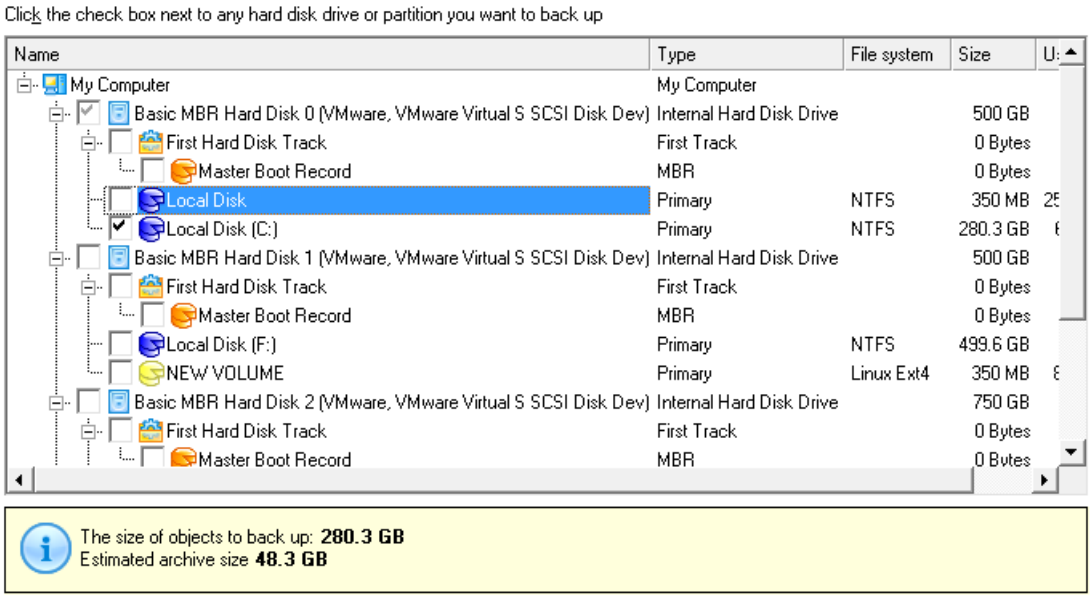
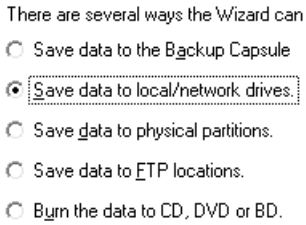


You've got the option to modify the default backup settings by marking the appropriate checkbox on this page.

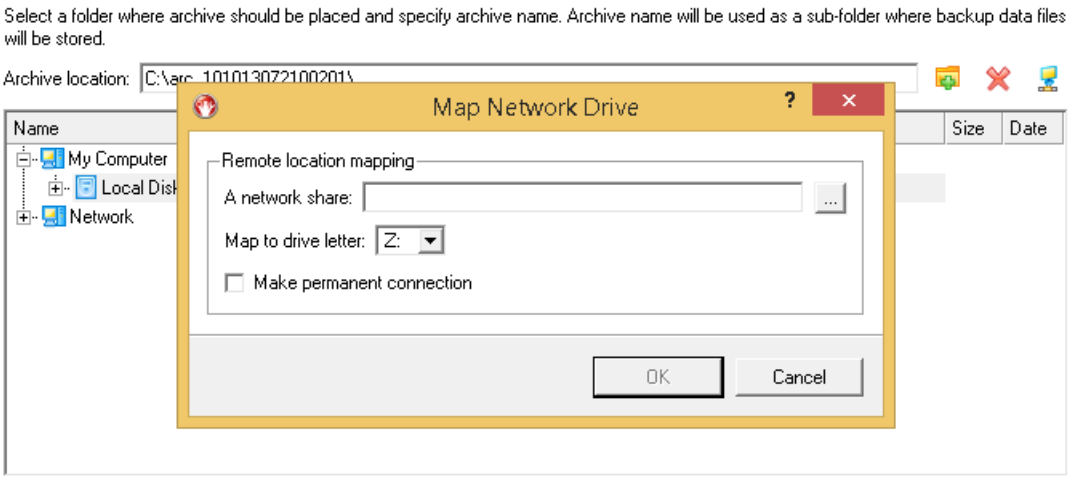
By default the program will take into account exclude filters set in the Settings dialog.

6. On the Backup Destination page, select the **Save data to local/network drives** option.



7. Map a network disk to place your backup image to:

- Call the Map Network Drive dialog by clicking the appropriate button;



- Click the standard browse button [...] to browse for the required network share or manually enter a path to it;
- Define a letter from the pull-down list of available drive letters;

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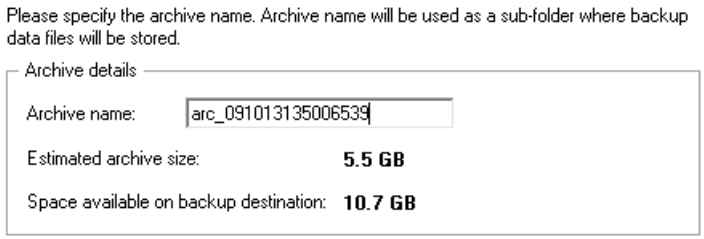
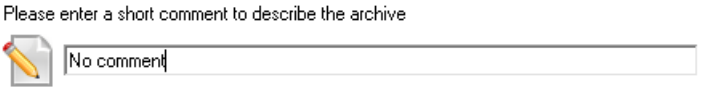
- Mark the checkbox to make this connection permanent. Otherwise it will only be available for the current Windows session;
- Click the Connect as user button at the foot of the dialog page to specify a user name and password to access the selected network share if necessary.

8. Edit the archive name if necessary.



Please take into account values of the parameters Estimated archive size and Space available on backup destination - if the archive size exceeds the available space, another network drive needs to be selected.

9. Add comments to your backup describing its contents.



10. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

Backing up files to an FTP/SFTP server

With our program you can protect the entire system, separate partitions, or particular files by backing up directly to online storages located on FTP or SFTP servers. Please note however, that due to certain limitations of the network bandwidth, the use of FTP/SFTP locations for storing many GBs of data (OS together with all on-disk data) isn't the best choice, but it's great for personal data, like your documents, email databases, photos, etc.

So let's see how to back up all office documents of the My Documents folder to an SFTP server:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Smart Backup**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. On the Wizard's Welcome page, click the Next button.
4. On the What to back up page, select **Documents** to protect all office documents inside the My Documents folder.

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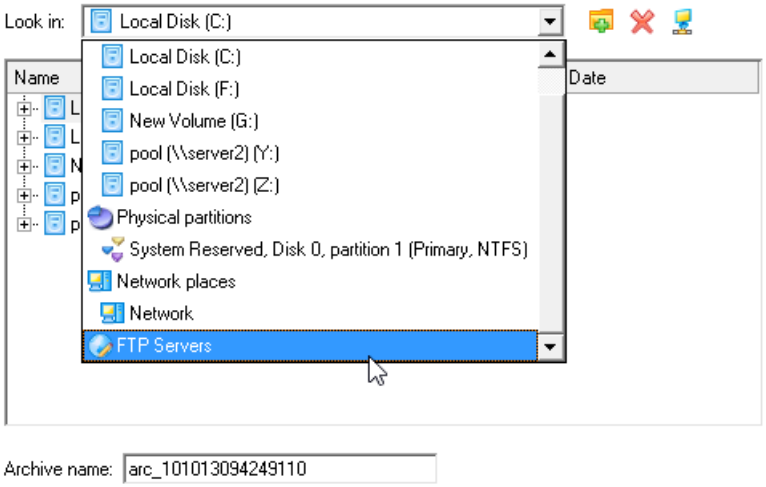
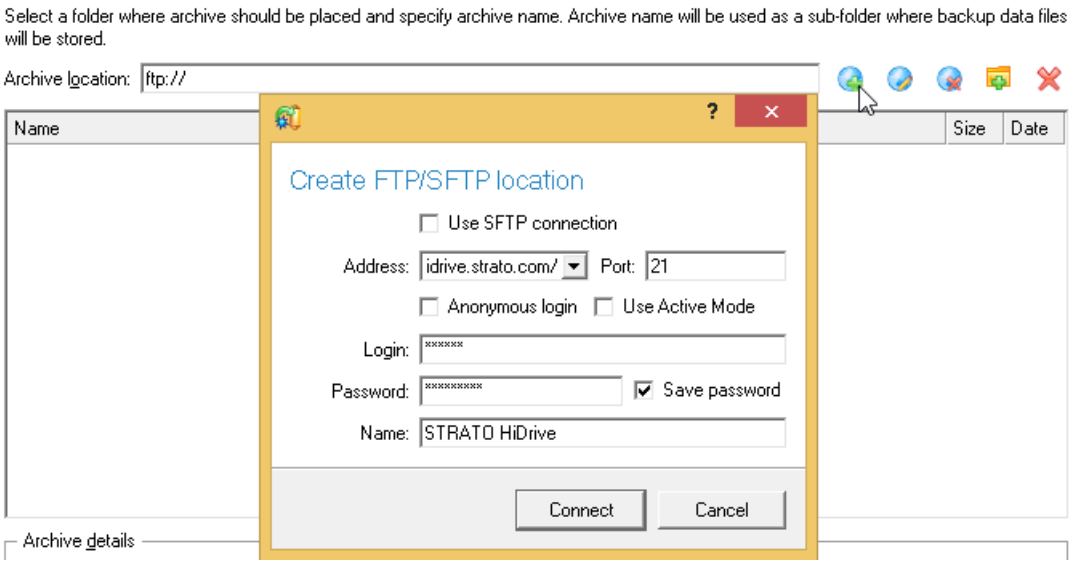
5. On the next page, choose **FTP Servers** as backup storage.



6. Click on the **Create an FPT Location** button to set up parameters for the required SFTP location.



- **Use SFTP connection**. Mark the option to connect to the desired SFTP server;

- **Address**. Type in its address;

- **Port**. Specify the required port (22 by default);

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- **Anonymous login**. Mark the option to set up anonymous connection. Typical username for this type of login is “anonymous”;

- **Allow Open SSH key-based authentication**. If your SFTP provider requires this type of authentication, mark the option to specify public and private keys and a passphrase;

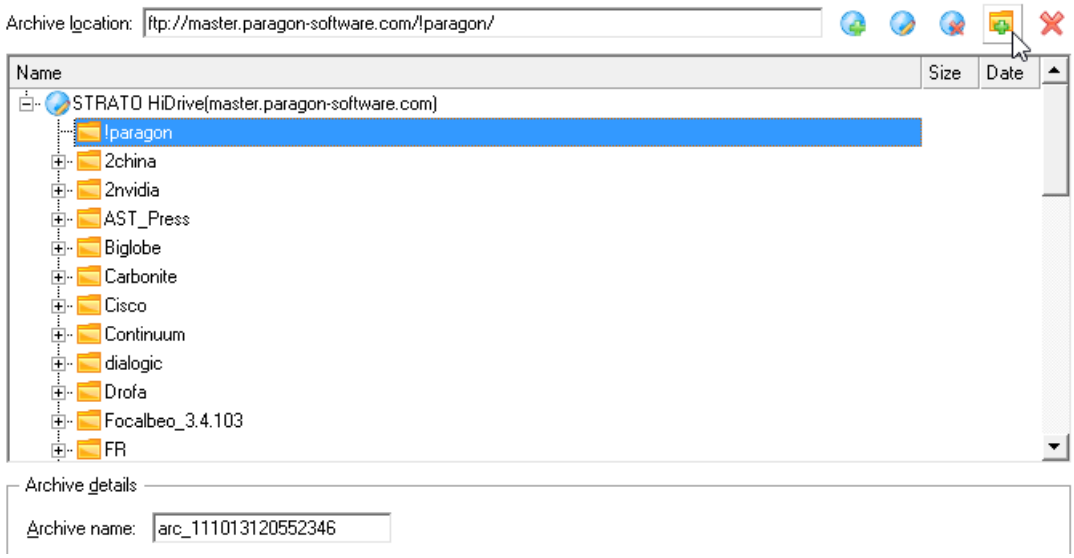
- **Login**. Enter a login;

- **Password**. Enter a password. Click **Remember password** to save it next time you back up to this location;

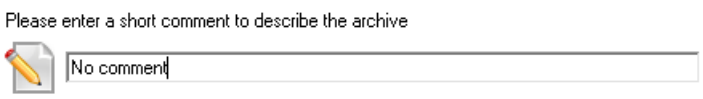
- **Name**. By default, the program uses the provided address as the connection name, which can be modified however.

You need to check out yourself Windows Firewall or programs of this kind let our program work with the required port (21 for FTP and 22 for SFTP by default).

7. When ready, click the **Connect** button to check out you’ve got access to the provided location. If yes, you’ll get a new item on the list named after this location. By clicking the + icon you can browse it to specify a more exact location for your backup. At this stage you can also edit the default archive name if necessary.



8. Add comments to your backup describing its contents.



9. To prevent unauthorized access to your personal data, we strongly recommend you to password protect your backup.

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10. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

This operation can also be accomplished with our recovery media.

Backing up a dual boot Mac to an external USB drive

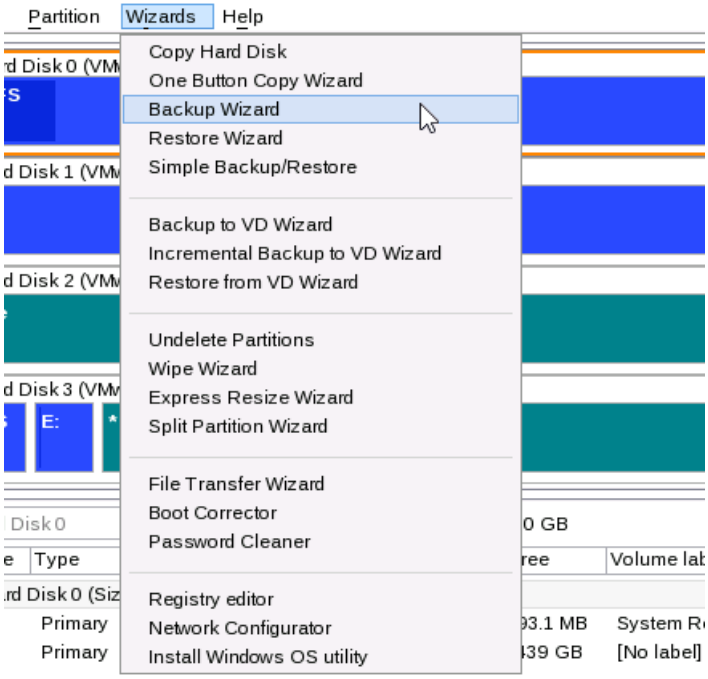
To back up a dual boot Mac (Mac OS X and Windows XP/Vista/7/8) and then place the resulted image to an external USB drive, please do the following:

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. Connect an external USB drive to the computer.
3. Restart the computer. It will be automatically started up into the Linux recovery environment (**Normal Mode**), since it's the only mode that provides support for Mac computers.
4. In the Linux launch menu select **Hard Disk Manager**.
5. Launch the Backup Wizard by selecting in the Main Menu of the program: **Wizards > Backup Wizard**.



6. On the Wizard's Welcome page, click the Next button.
7. On the What to back up page, select your Mac hard disk.

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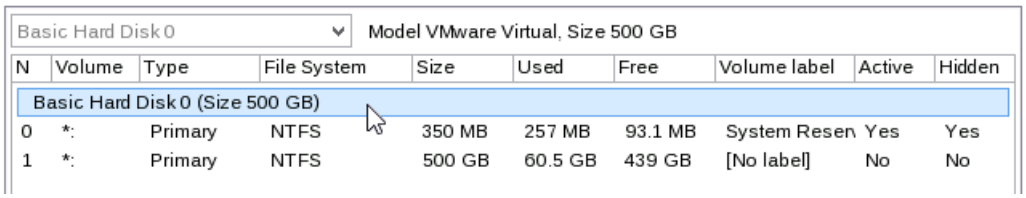
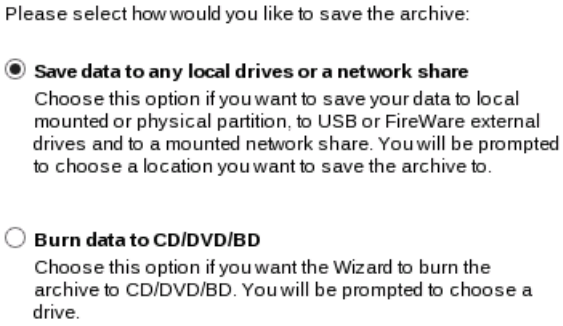
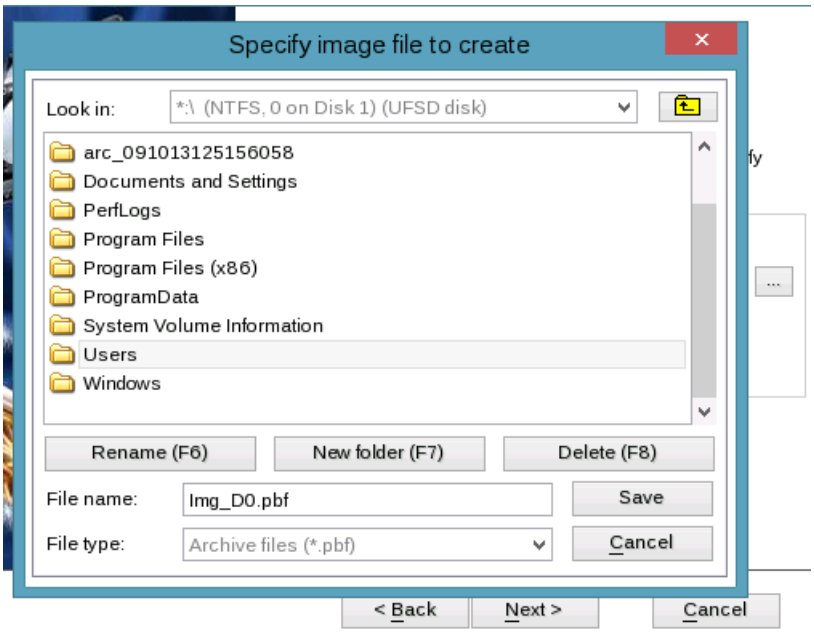


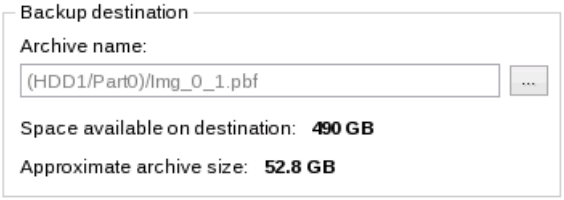
8. On the Backup Destination page, select the **Save data to any local drive or a network share** option.



9. Select an external USB drive as a backup destination.



10. Edit the archive name if necessary.



Please take into account values of the parameters Estimated archive size and Space available on backup destination - if the archive size exceeds the available space, another drive needs to be selected.

11. Add comments to your backup describing its contents.

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12. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

This operation can also be accomplished under Windows.

Backing up files to a local mounted/unmounted (without drive letter assigned) partition

To back up required files or folders and then place the resulted image to a local mounted/unmounted drive, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Smart Backup**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. On the Wizard's Welcome page, click the Next button.
4. On the What to back up page, first take a look at the ready-made backup templates. If none of the options meets you needs (just our case), then select **Other Files and Folders** to create a file-based backup of certain data.

5. On the What folders and files to back up page you can see a list of all partitions (both mounted and unmounted) available in the system. Mark a checkbox opposite a file, folder or even a whole partition to build up contents of the future backup image.

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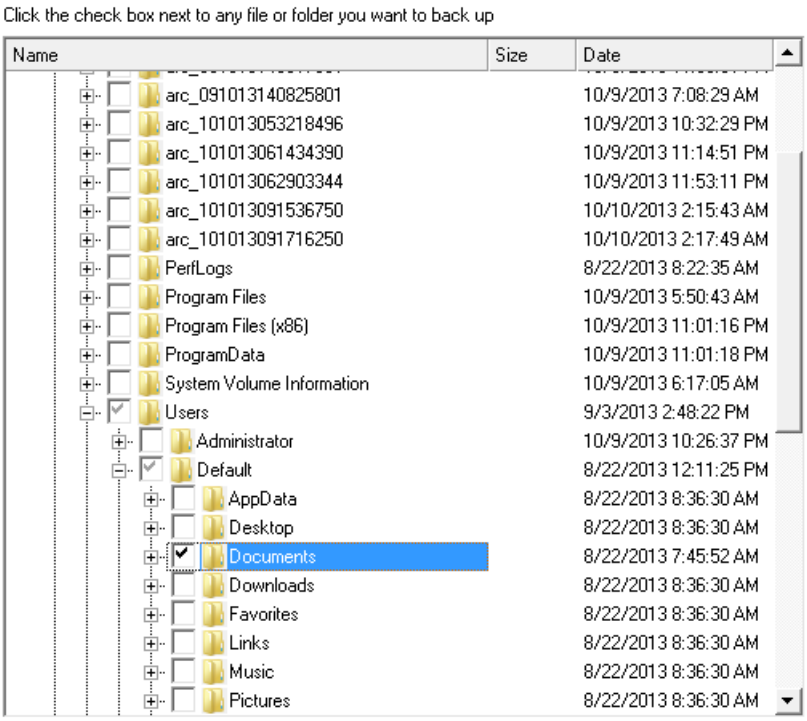
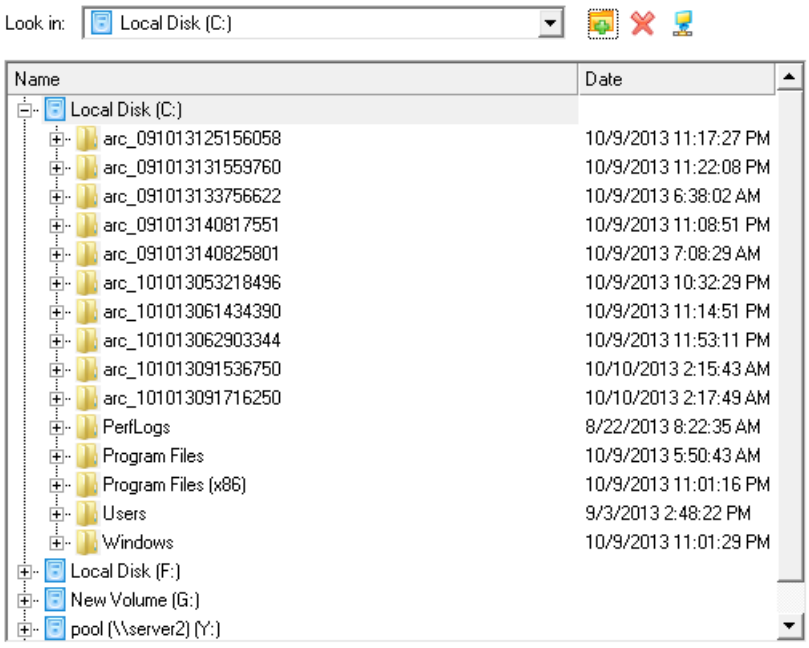
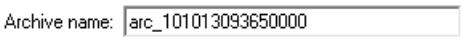


6. On the Backup Destination page, select a local mounted/unmounted (without drive letter assigned) disk as a backup destination.



7. Edit the archive name if necessary.



8. **Specify include masks**. The program includes a lot of ready-made filters to effectively control contents of your backup images.

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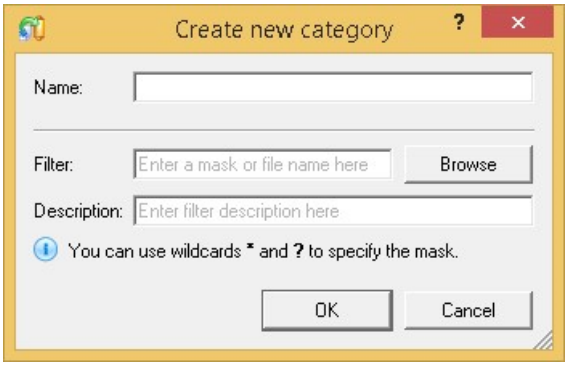
You can also create your own filter by clicking the **Add category…** button.



- **Name**. Give to the filter any name you like, but try to use an informative one;
- **Filter**. Press the Browse button to select files or folders you would like to be included or specify a filter mask by using * or ? wildcards;
- **Description**. Add a short description to the filter not to miss it up later.

Click the OK button and you will get a new item on the list of filters. By marking/unmarking a checkbox opposite its name you can choose whether to use it or not.

By setting an include mask, you automatically ignore files that do not match to it, thus they won't be added to the backup image.

9. **Specify exclude masks**. The program includes a lot of ready-made filters to effectively control contents of your backup images.

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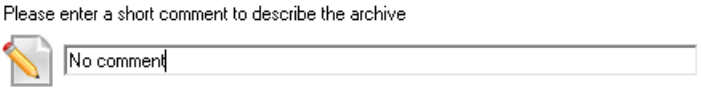
10. Add comments to your backup describing its contents.



11. To prevent unauthorized access to your personal data, we strongly recommend you to password protect your backup.

12. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

This operation can also be accomplished with our recovery media.

Creating a differential to a full partition backup

To update an image of the selected partition, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Differential Backup**.
3. On the Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page, specify the required full (base) partition archive:

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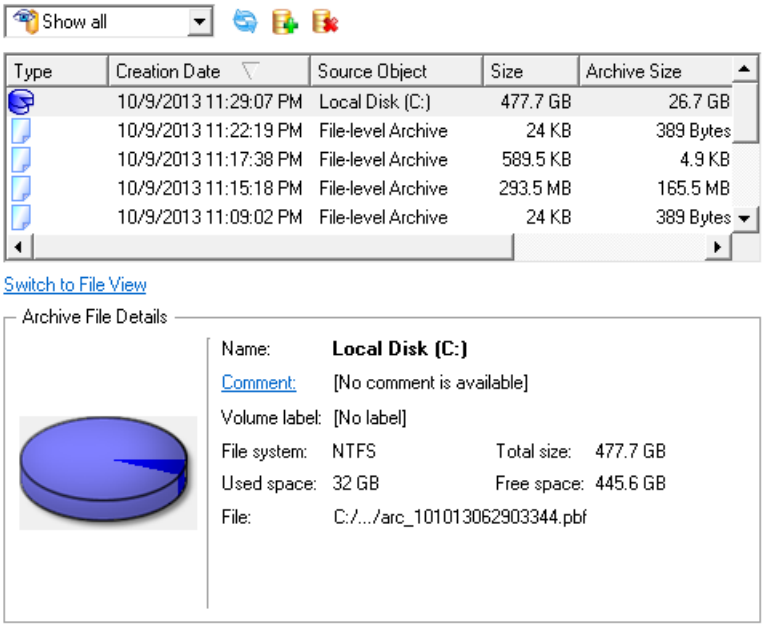
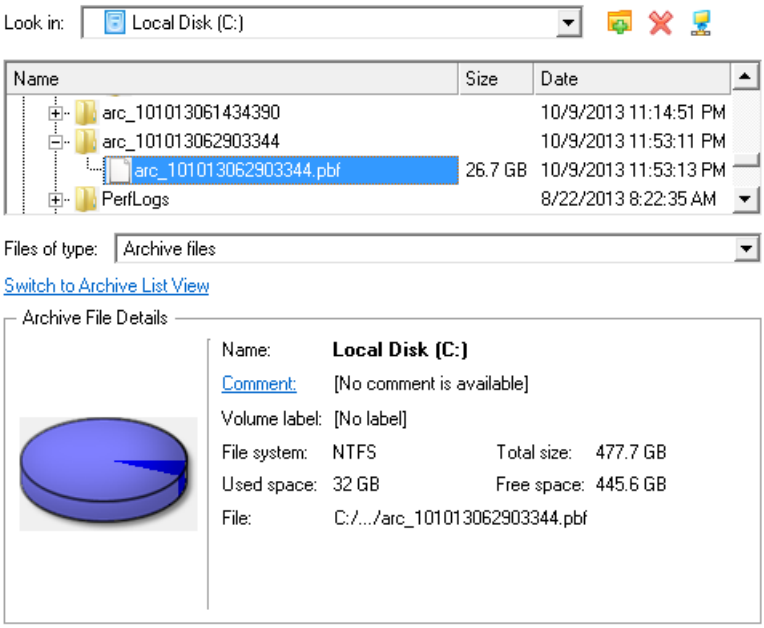
- By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).



To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

- By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.



To know more on the subject, please consult the Viewing Image Properties chapter.

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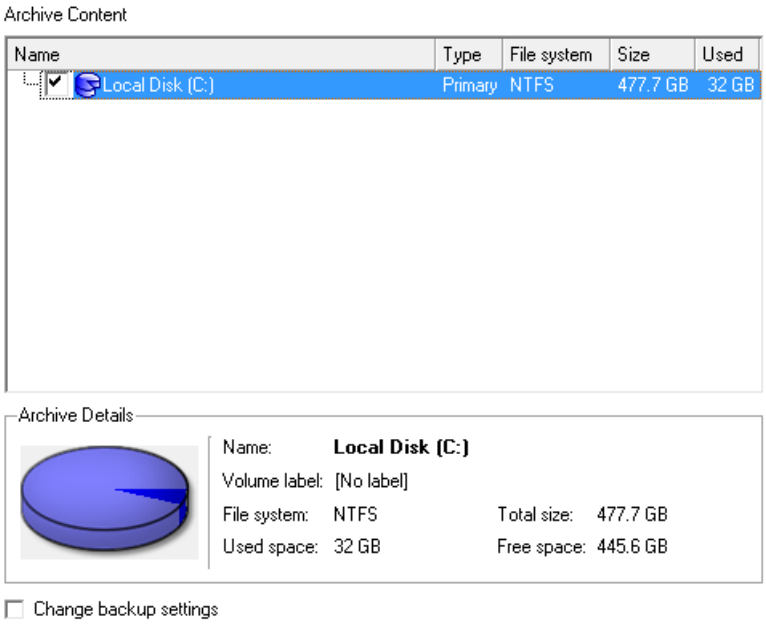
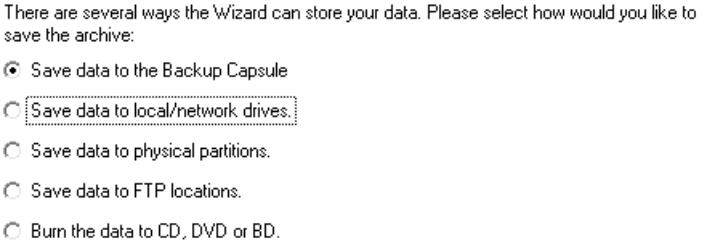
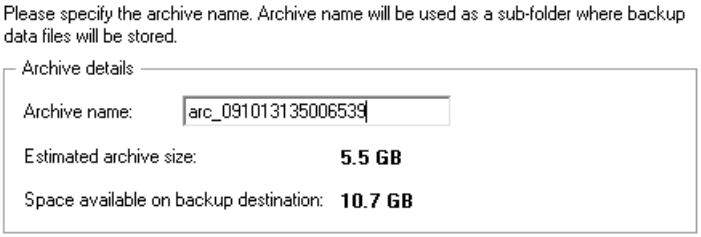
5. The Archive Content page displays detailed information about the contents of the archive. It includes a full description of properties about the partition. In addition, there is the possibility to modify backup settings. To activate the advance mode, you need to mark the appropriate option at the foot of the page.



6. On the Backup Destination page, select where you want to place your backup image.

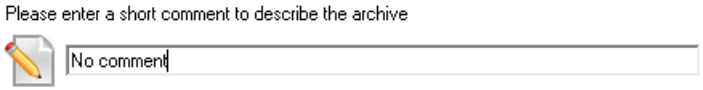


7. Edit the archive name if necessary.



Please take into account values of the parameters Estimated archive size and Space available on backup destination - if the archive size exceeds the available space, another drive needs to be selected.

8. Add comments to your backup describing its contents;



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9. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

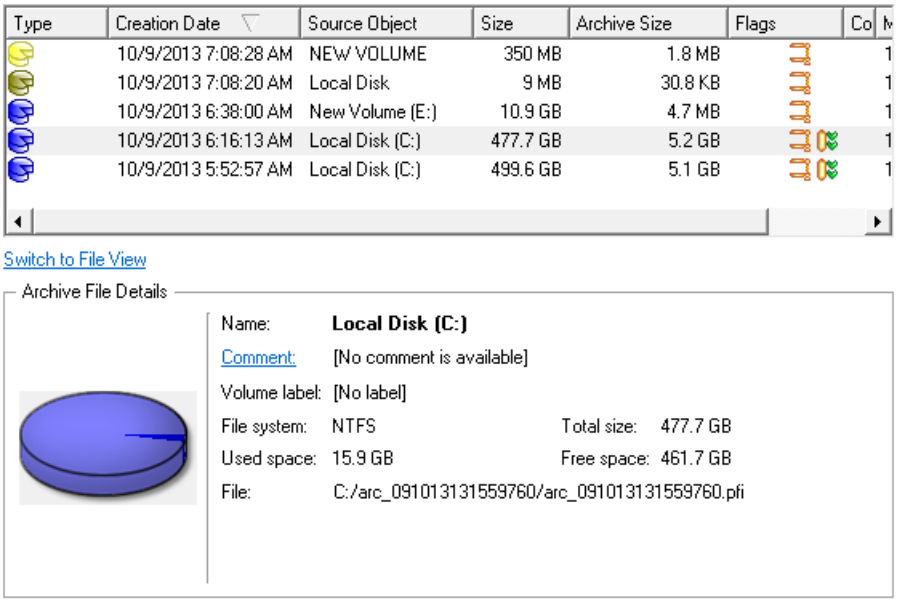
After the operation is completed you receive a differential backup of the selected partition. It is placed into the specified destination (a local or network disk, the Backup Capsule or a CD/DVD disc), its features defined by the wizard.

This operation can also be accomplished with our recovery media.

Creating a file increment to a full partition backup

To update only files you need since the last full partition backup, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Create File Complement**.
3. On the Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page, specify the required full (base) partition archive:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).



   To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

   - By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.

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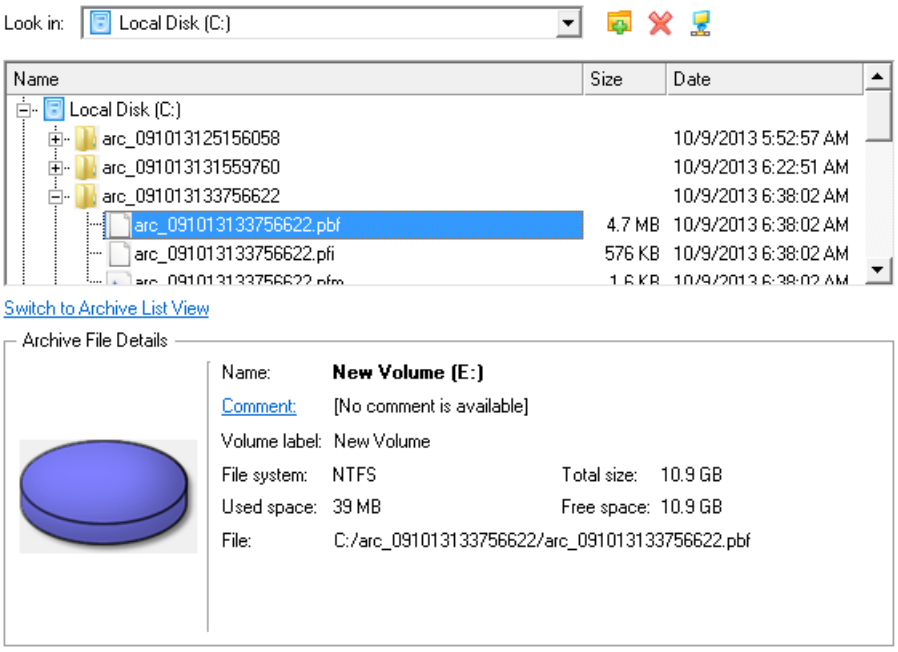
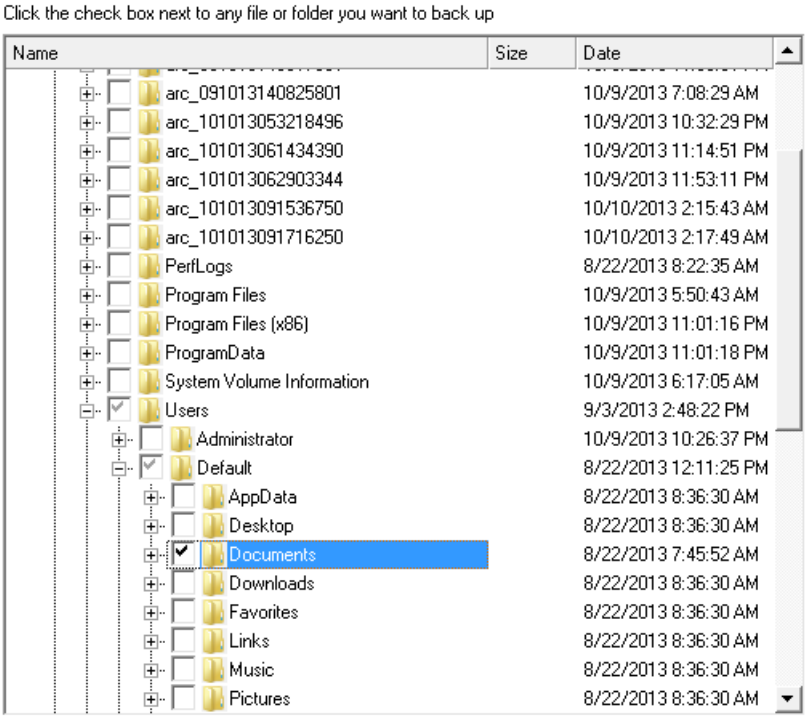


To know more on the subject, please consult the Viewing Image Properties chapter.

5. On the What folders and files to back up page you can see contents of the selected partition archive. Mark a checkbox opposite a file or folder to build up contents of the future incremental image.



6. **Specify include masks**. The program includes a lot of ready-made filters to effectively control contents of your backup images.

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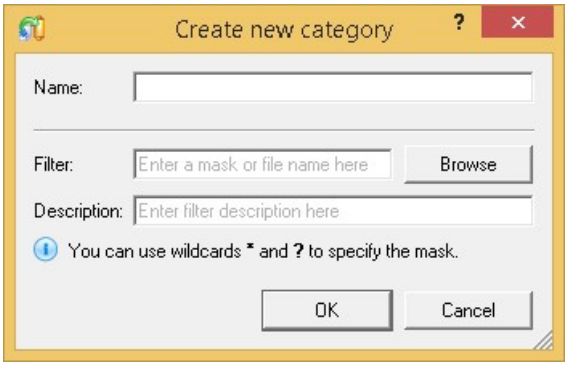
You can also create your own filter by clicking the **Add category…** button.



- **Name**. Give to the filter any name you like, but try to use an informative one;
- **Filter**. Press the Browse button to select files or folders you would like to be included or specify a filter mask by using * or ? wildcards;
- **Description**. Add a short description to the filter not to miss it up later.

Click the OK button and you will get a new item on the list of filters. By marking/unmarking a checkbox opposite its name you can choose whether to use it or not.

By setting an include mask, you automatically ignore files that do not match to it, thus they won't be added to the backup image.

7. **Specify exclude masks**. The program includes a lot of ready-made filters to effectively control contents of your backup images.

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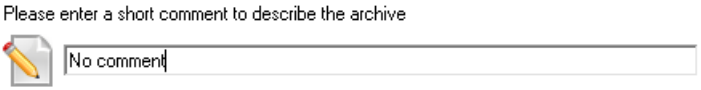
8. Add comments to your backup describing its contents.



9. On the Backup Summary page review all parameters of the operation and modify them if necessary. Click the Next button to start the backup process.

After the operation is completed you receive an incremental backup of the selected partition archive containing information specified in the wizard. It is placed into the same destination as the base image.

This operation can also be accomplished with our recovery media.

Creating an increment to a full file backup

To update a file backup, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Create Incremental File Archive**.
3. On the Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page, specify the required full (base) file archive:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).

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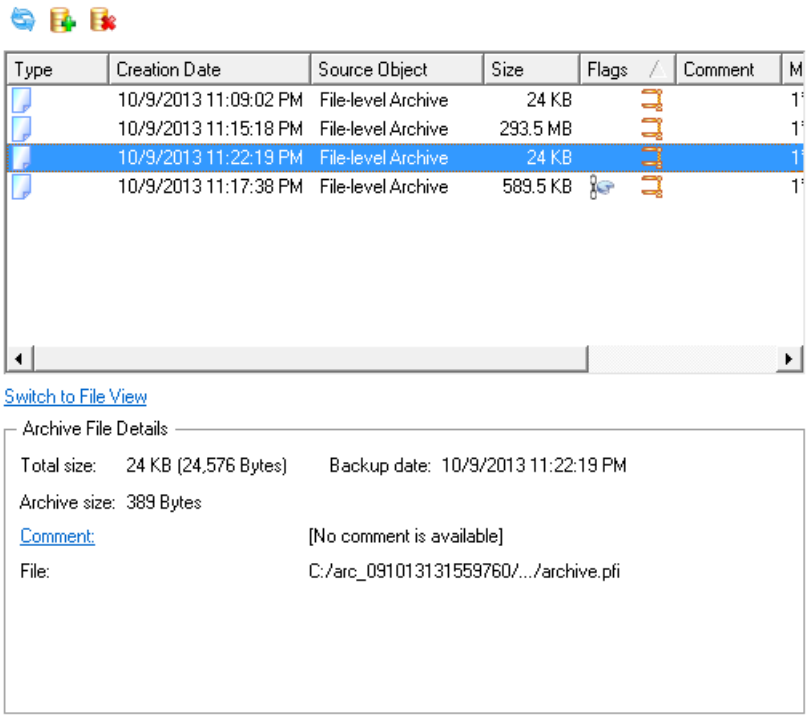
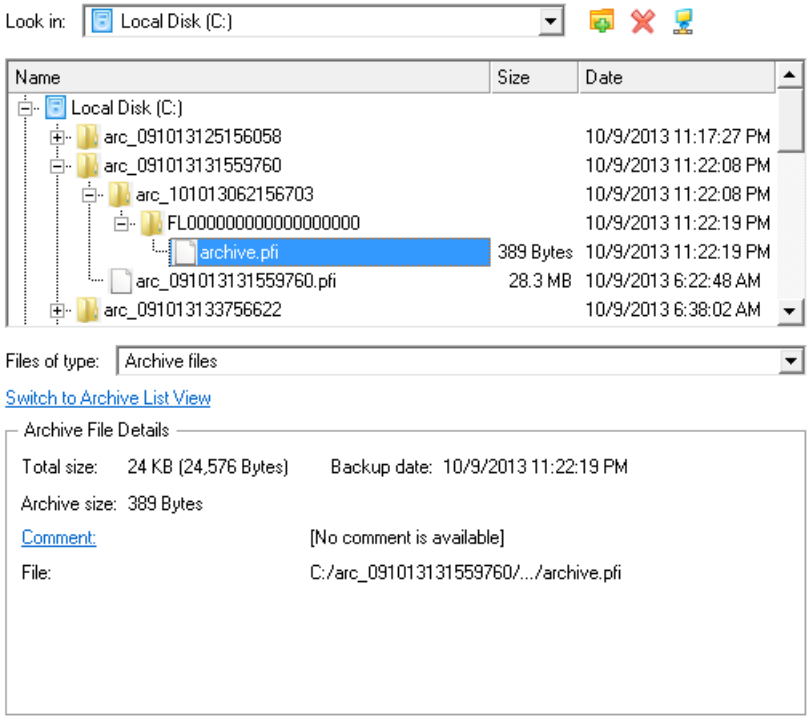


To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

- By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.



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To know more on the subject, please consult the Viewing Image Properties chapter.

After the operation is completed you receive an incremental backup of the selected file archive. It is placed into the same destination as the base image.

This operation can also be accomplished with our recovery media.

Recovery Scenarios

New Backup Format

Restoring an entire hard disk or system partition from network storage

Let's assume that your computer fails to boot because of a virus attack or corruption of some system critical files. But you've got a backup of your hard disk on a remote backup server. That's just enough to easily get your system back on track again.

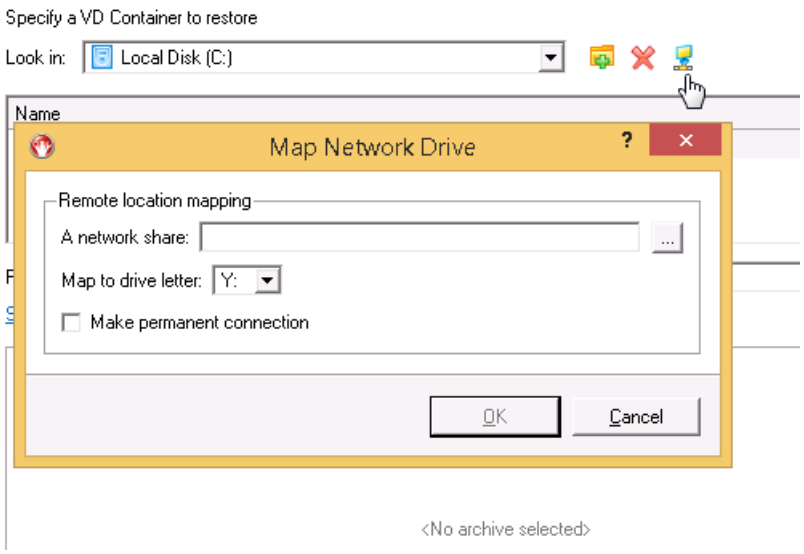
1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. Select **Switch to Full Scale Launcher**, then click the **Restore from VD** item of the Wizards menu.
3. On the Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page you need to specify the required backup image:
   - Map a network disk where your archives are placed:

     - Call the Map Network Drive dialog by clicking the appropriate button;



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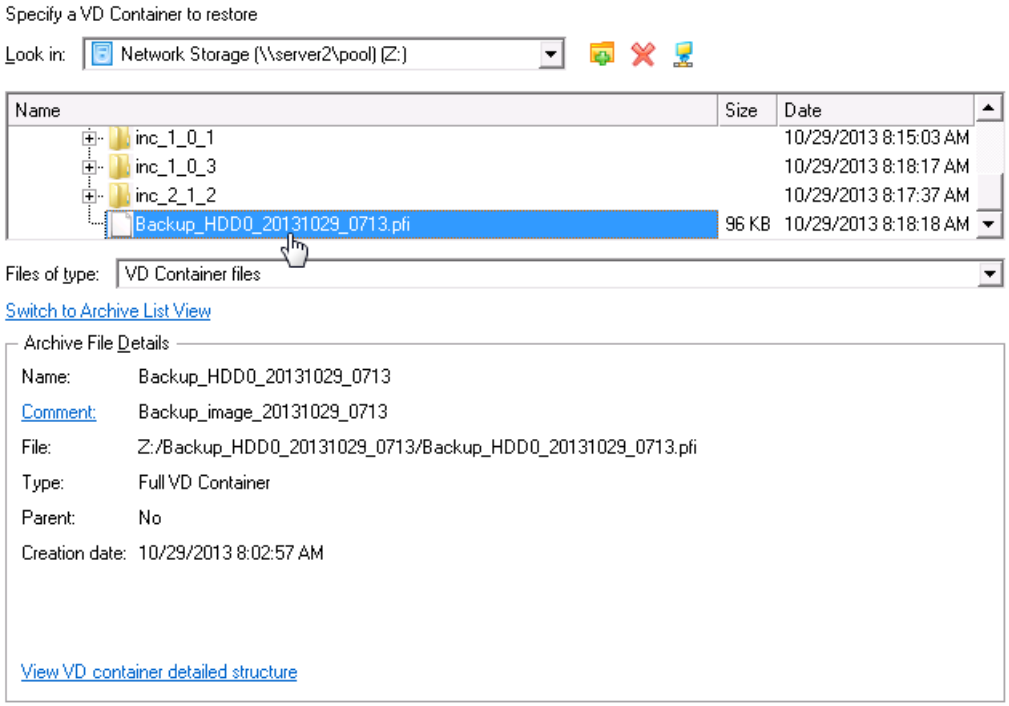
- Click the standard browse button [...] to browse for the required network share or manually enter a path to it;

- Define a letter from the pull-down list of available drive letters;

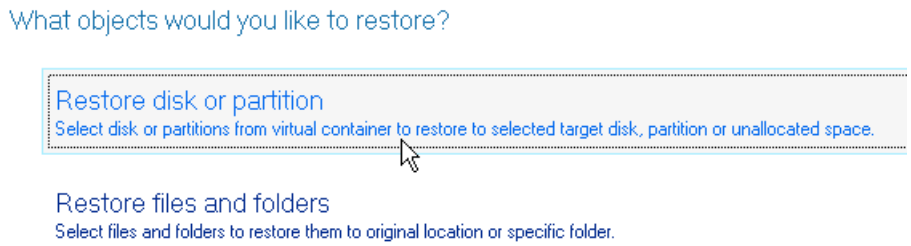
- Click the **Connect as user** button at the foot of the dialog page to specify a user name and password to access the selected network share if necessary.

You can also map a network disk with Network Configurator.

- Choose the required archive in the browser-like window. The Archive File Details section displays a short description of the selected image. If you need more information on the selected backup object, please click the corresponding link at the bottom of the section. Click **Next** to proceed.



5. Select **Restore disk or partition**.



6. The What to Restore page displays detailed information about the contents of the archive. Select the required item to restore.

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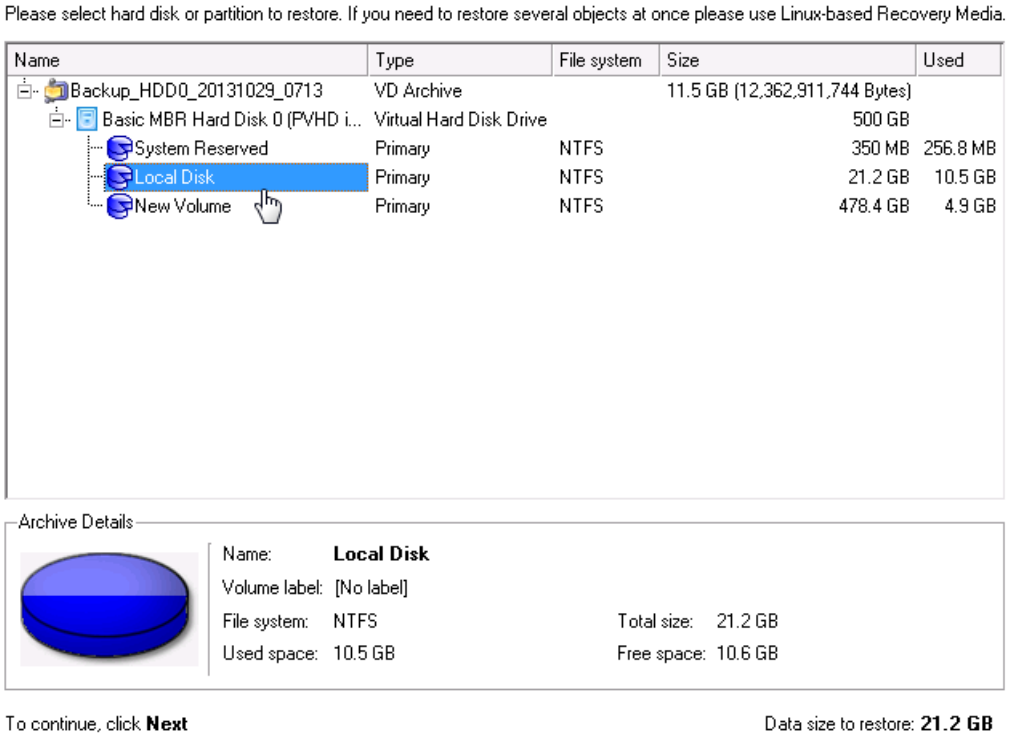
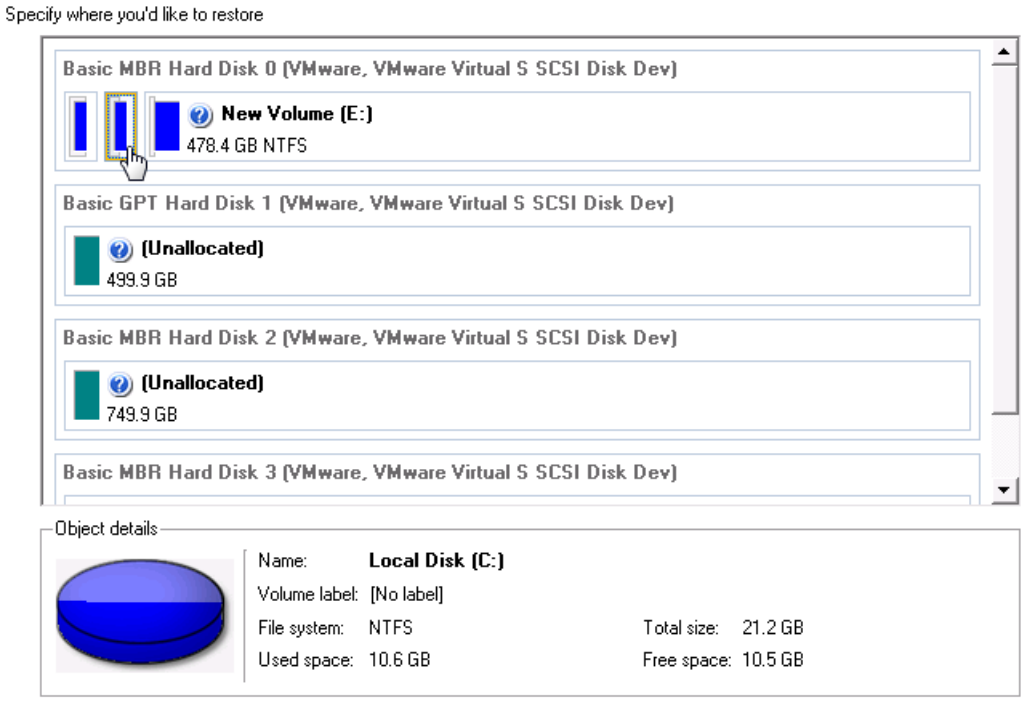


If you need to restore several backup objects in one operation, please use the Linux-based recovery media.

7. On the Where to Restore page specify a hard disk, then one of its partitions to restore the image to (if several in your computer). By default, the program offers to restore the archive exactly where it belongs. That's what we actually need.



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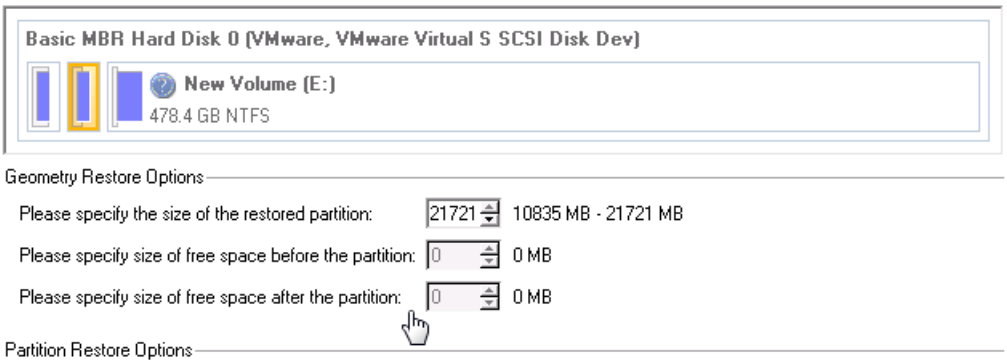
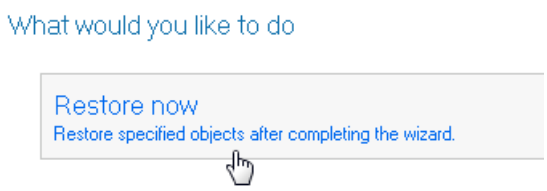
All contents on the partition selected for restoring purposes will be deleted during the operation.

8. On the Restore Results page you can see the resulted disk layout. Besides there's the possibility to change size of the partition and its location if necessary as well as assign a particular drive letter. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the **Switch EFI to boot from destination drive** option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through Boot Corrector.



9. Choose whether to execute the operation immediately after finishing the wizard and applying the pending changes (only if the virtual mode is enabled).



10. Click **Finish** to complete the wizard, then apply the pending changes.
11. In the Progress window you can see in real-time a detailed report on all actions carried out by the program. Mark the checkbox at the bottom of the window to automatically switch off the computer on the successful accomplishment of the restore operation.
12. After completing the operation, please reboot the computer.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

Restoring individual files and folders

1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

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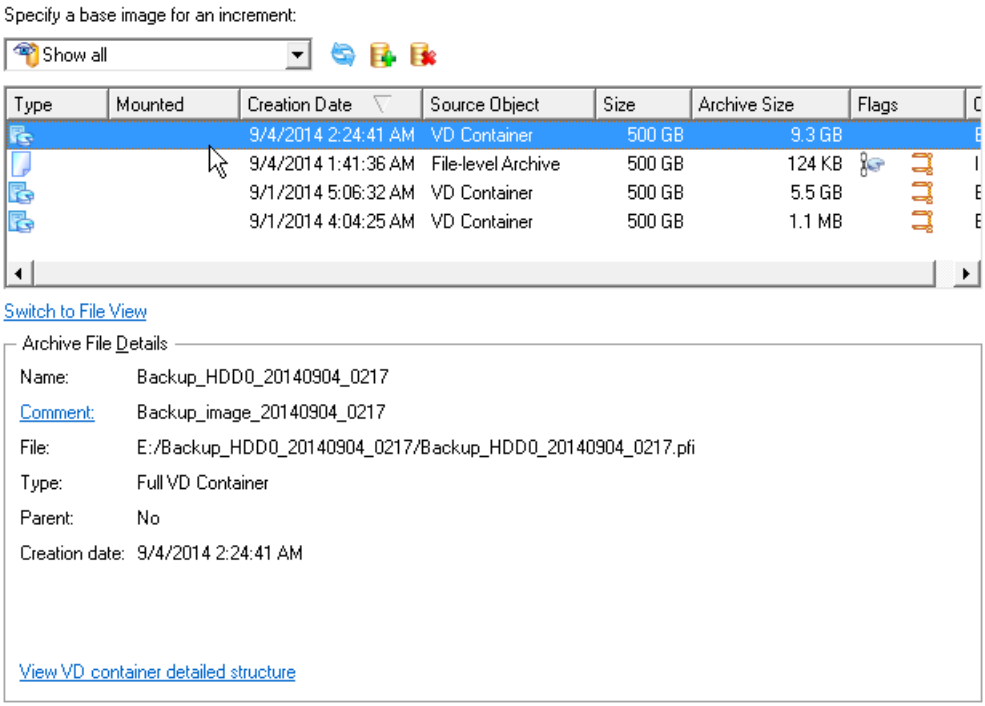
To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. Select **Switch to Full Scale Launcher**, then click the **Restore from VD** item of the Wizards menu.
3. On the Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page, specify the required virtual container:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).



To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

   - By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.

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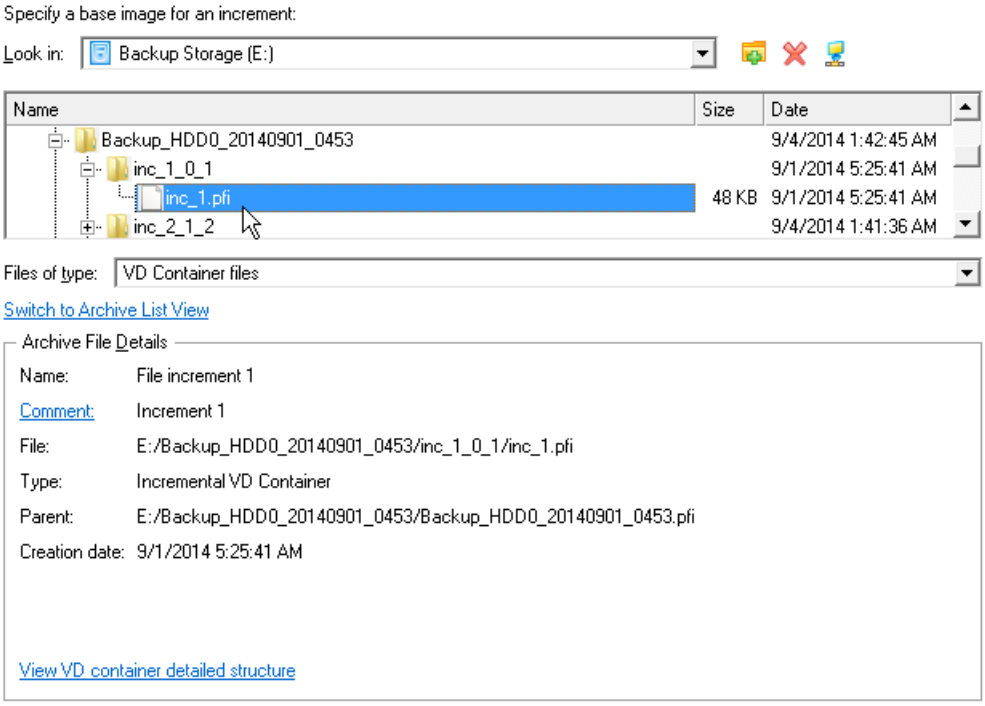
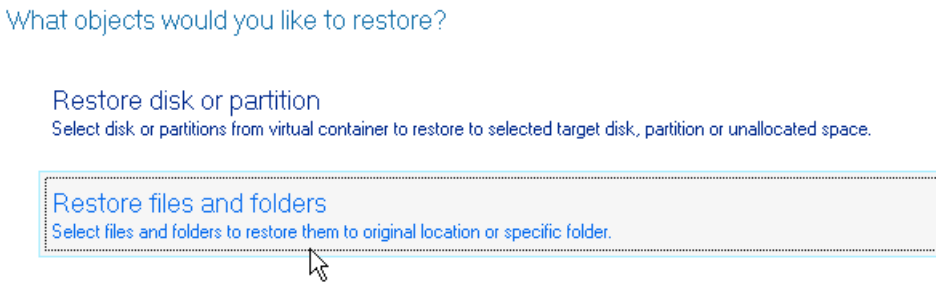


To know more on the subject, please consult the Viewing Image Properties chapter.

5. Select **Restore files and folders**.



6. On the next page specify what you need to extract from the backup by marking checkboxes next to the required data items. At the right lower corner of the window you can see the resulted amount of the selected data.

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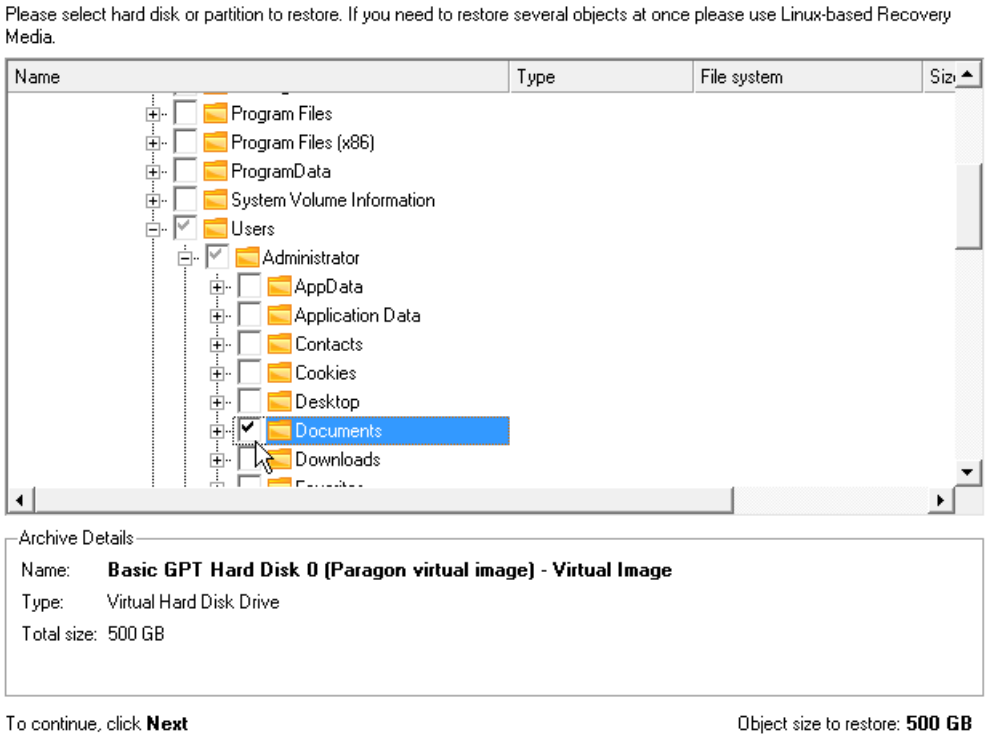
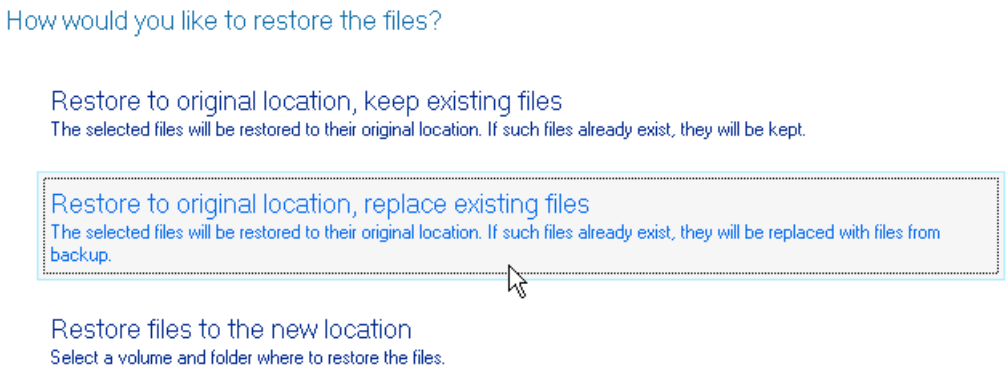
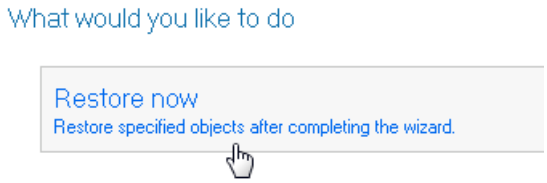


7. Next you need to choose the way the selected data will be restored. In our case we'd rather restore contents of the backup to its original location with replacing existing files as well.



8. Choose whether to execute the operation immediately after finishing the wizard and applying the pending changes (only if the virtual mode is enabled).



9. Click **Finish** to complete the wizard, then apply the pending changes.
10. In the Progress window you can see in real-time a detailed report on all actions carried out by the program. Mark the checkbox at the bottom of the window to automatically switch off the computer on the successful accomplishment of the restore operation.

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This operation can also be accomplished under Windows.

Legacy Backup Format

Restoring a hard disk from the bootable Backup Capsule

Let's assume that your computer fails to boot because of a virus attack or corruption of some system critical files. But you've got the bootable backup capsule containing a backup of your hard disk. That's just enough to easily get your system back on track again.

To restore your hard disk from a backup image contained in the backup capsule when the current OS is down, please do the following:

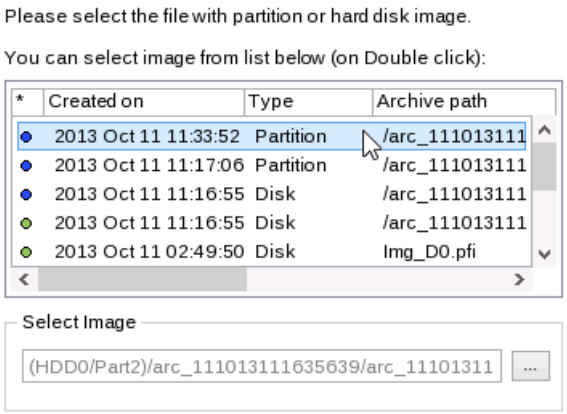
1. Start up the computer from the bootable backup capsule. By default, the program offers to use the F1 hot key to boot from it.

This scenario implies that the backup capsule is bootable.

2. In the boot menu select **Normal Mode** to use the Linux recovery environment (more preferable) or **Safe Mode** to use the PTS DOS recovery environment (in case you've got problems with Linux).

By default the Normal Mode will be automatically initiated after a 10 second idle period.

3. In the Linux launch menu select the Simple Restore Wizard. You can find the same wizard in PTS DOS as well.
4. On the Wizard's Welcome page, click the Next button.
5. On the What to Restore page, you can see a list of available images (if several). Most likely the required archive will be there too. If not, click the standard browse button [...] to find it. When you find your image, double click on it to proceed.



6. On the Image Properties page, make sure that you select the correct image by viewing the provided information about the archive.

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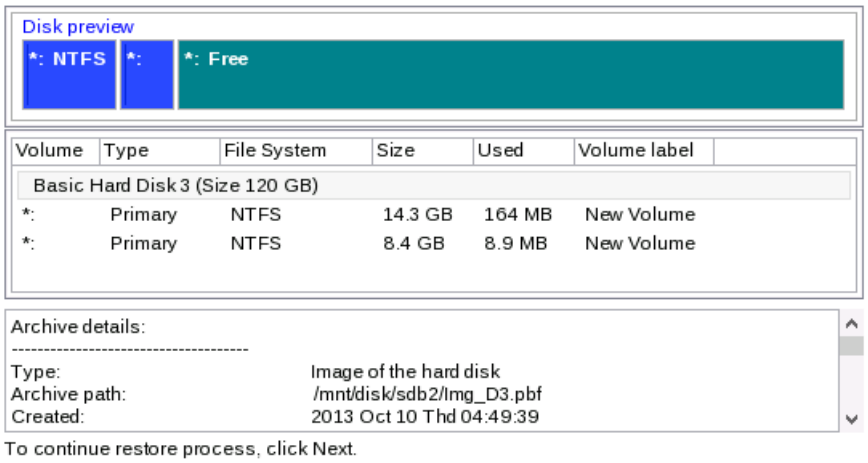
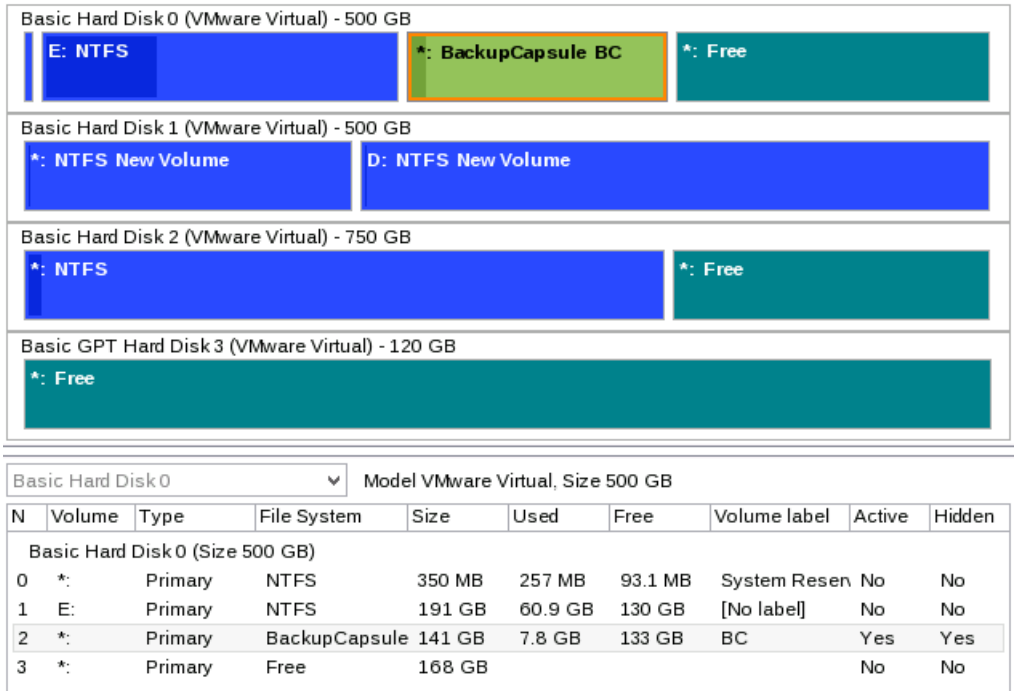


7. On the next page specify a hard disk to restore the image to (if several in your computer). By default, the program offers to restore the archive exactly where it belongs. That's what we actually need.



You can also make the program resize the on-disk partitions proportionally if necessary by marking the appropriate checkbox.

All contents on the disk selected for restoring purposes will be deleted during the operation.

8. On the Restore Summary page you can see your hard disk layout before and after the operation. Click the Next button to initiate the restore process.

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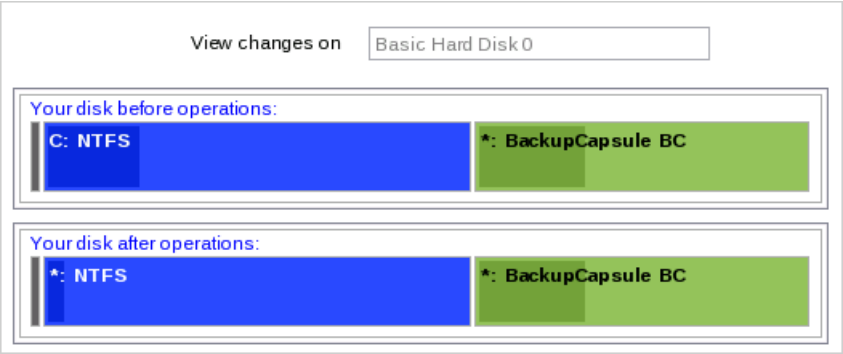
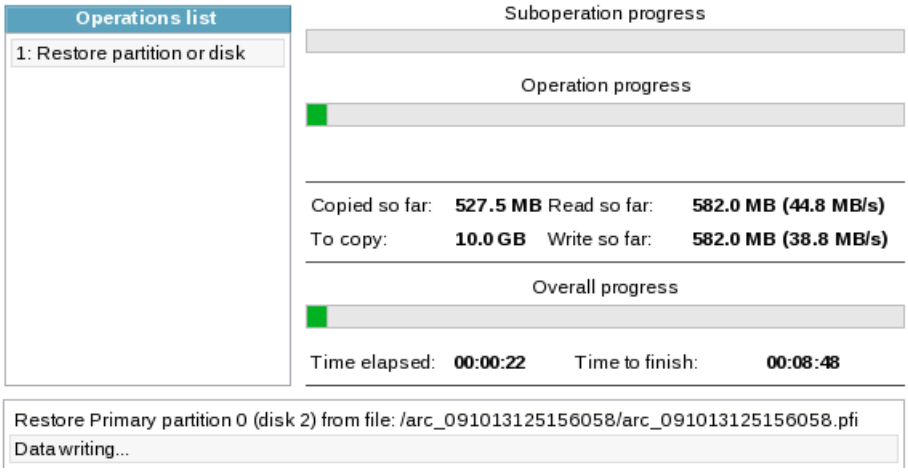


9. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.



10. After completing the operation close the wizard and reboot the computer.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

Restoring a system partition from external media (CD/DVD)

Let's assume that your computer fails to boot because of a virus attack or corruption of some system critical files. But you've got a backup of your system partition on a bootable DVD disc. That's just enough to easily get your system back on track again.

To restore your system partition from a backup image located on CD/DVD when the current OS is down, please do the following:

1. Insert a CD/DVD disc containing the previously prepared backup image into a CD/DVD drive (the BIOS must be enabled to boot the system from the CD/DVD device).

This scenario implies that you have got a bootable archive on your CD/DVD.

In case the backup image is stored on several CD/DVD disks, please insert the first one.

2. Restart the computer.
3. In the boot menu select **Normal Mode** to use the Linux recovery environment (more preferable) or **Safe Mode** to use the PTS DOS recovery environment (in case you've got problems with Linux). Moreover you've got the option to boot into the **Low-Graphics Safe Mode** (PTS DOS safe mode) to cope with a serious hardware

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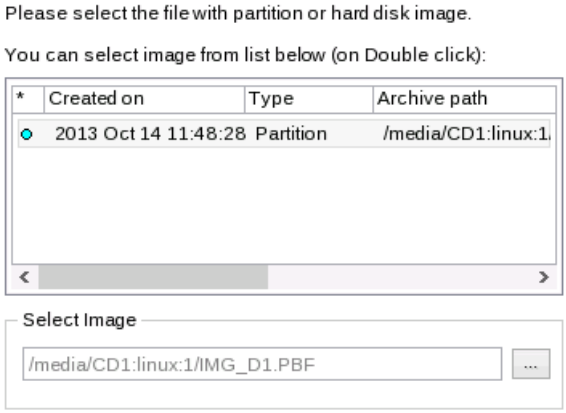
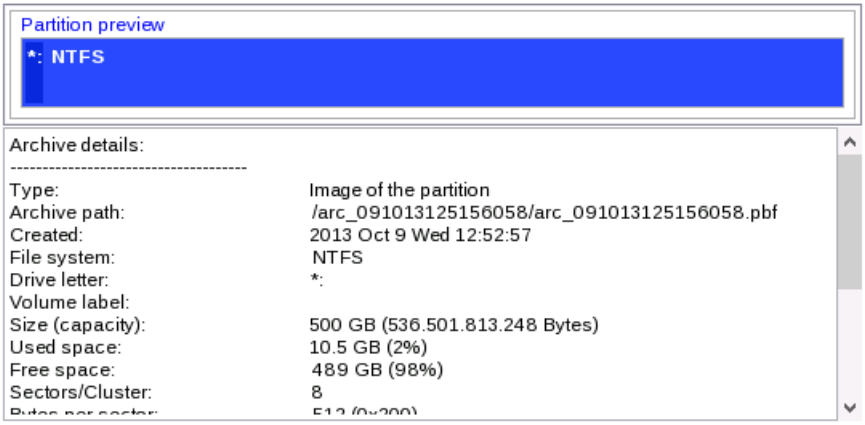
incompatibility. In this case, only the minimal set of drivers will be included, like hard disk, monitor, and keyboard drivers. This mode has simple graphics and a simple menu.

By default the Normal Mode will be automatically initiated after a 10 second idle period.

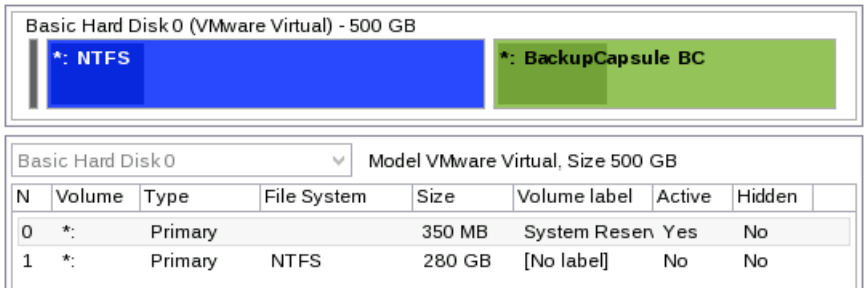
4. In the PTS DOS launch menu select the Simple Restore Wizard. You can find the same wizard in Linux as well.
5. On the Wizard's Welcome page, click the Next button.
6. On the What to Restore page, you can see a list of available images (if several). Most likely the required archive will be there too. If not, click the standard browse button [...] to find it. When you find your image, double click on it to proceed.



7. On the Image Properties page, make sure that you select the correct image by viewing the provided information about the archive.



8. On the next page specify a hard disk, then one of its partitions to restore the image to (if several in your computer). By default, the program offers to restore the archive exactly where it belongs. That's what we actually need.



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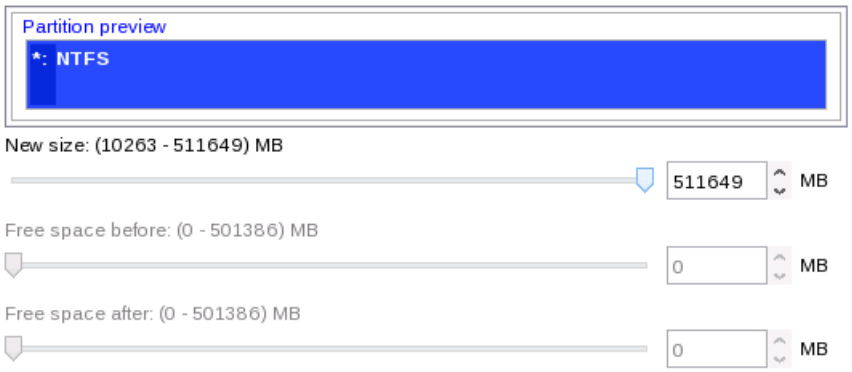
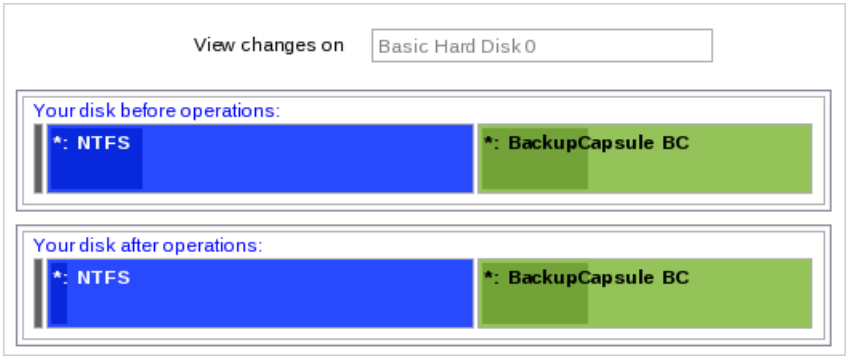
All contents on the partition selected for restoring purposes will be deleted during the operation.

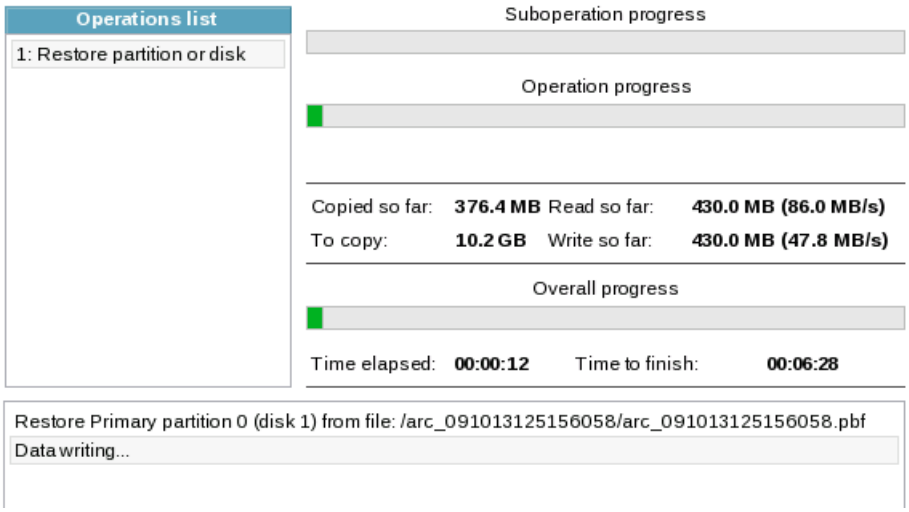
9. On the Partition Start and Size page you can change size of the partition and its location if necessary.



10. On the Restore Summary page you can see your hard disk layout before and after the operation. Click the Next button to initiate the restore process.



11. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.



12. After completing the operation close the wizard, and then reboot the computer.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

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Restoring a system partition from a network drive

To restore your system partition from a backup image located on a network drive, please do the following:

1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

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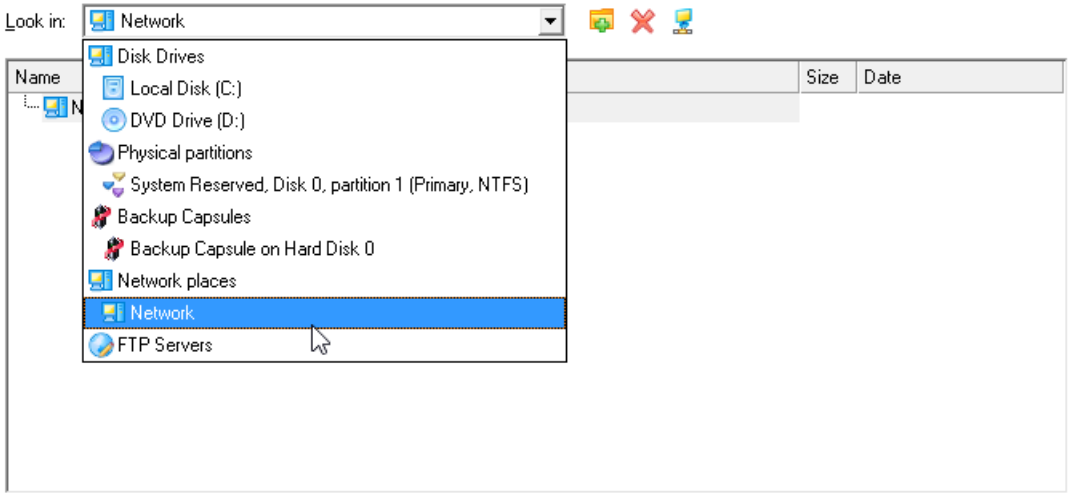
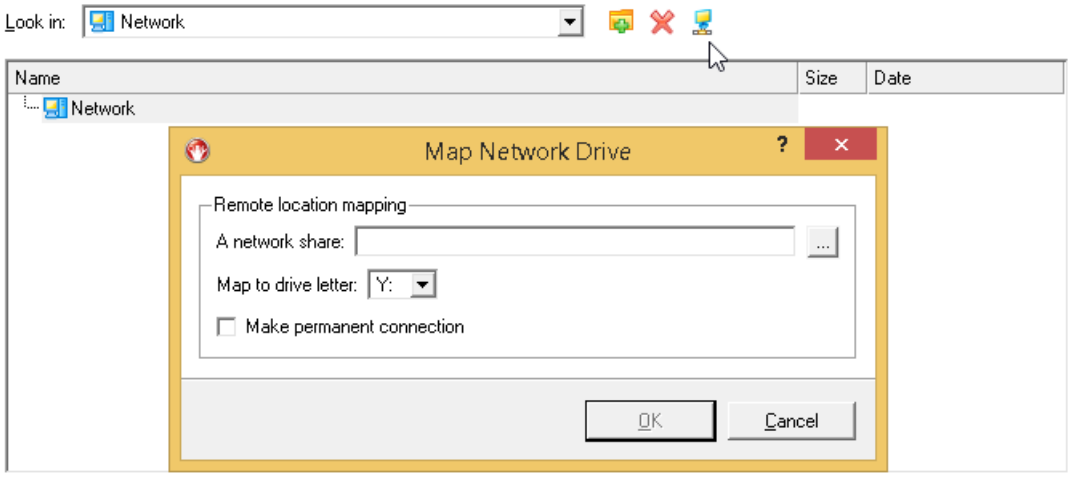
2. Enable the Legacy features view.
3. Launch the **Restore Wizard**.
4. On the Restore Wizard's Welcome page, click the Next button.
5. On the Browse for Archive page you need to specify the required backup image. So you should take the following steps to do that:
   - Select **Network** as a backup destination;



   - Map a network disk where your archives are placed:

     - Call the Map Network Drive dialog by clicking the appropriate button;



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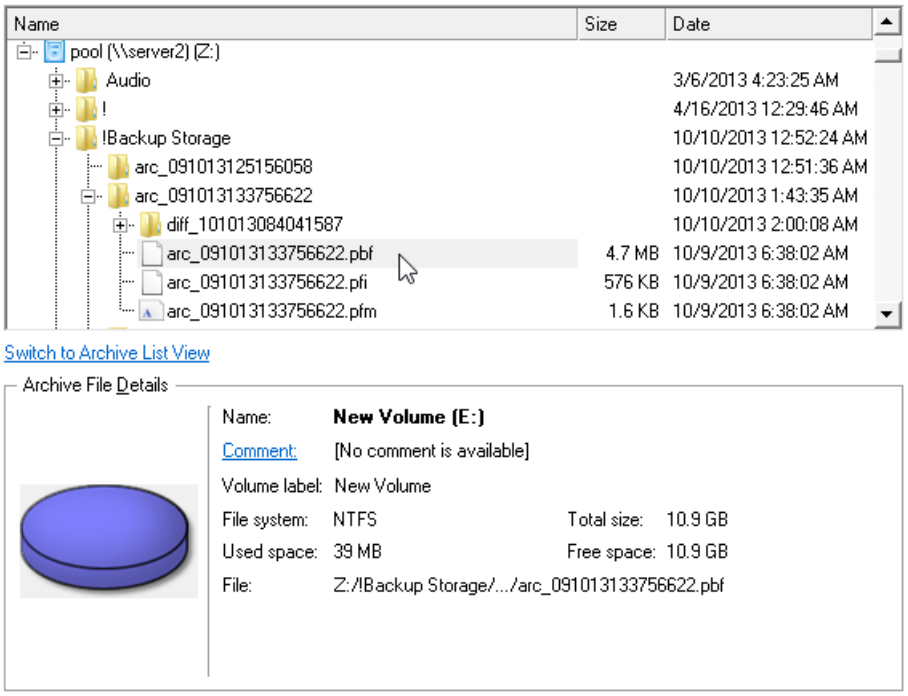
- Click the standard browse button [...] to browse for the required network share or manually enter a path to it;

- Define a letter from the pull-down list of available drive letters;

- Click the **Connect as user** button at the foot of the dialog page to specify a user name and password to access the selected network share if necessary.

You can also map a network disk with Network Configurator.

- Choose the required archive in the browser-like window. The Archive File Details section displays a short description of the selected image.



6. The What to Restore page displays detailed information about the contents of the archive. Select the required item to restore. In our case it is the first partition of the disk.

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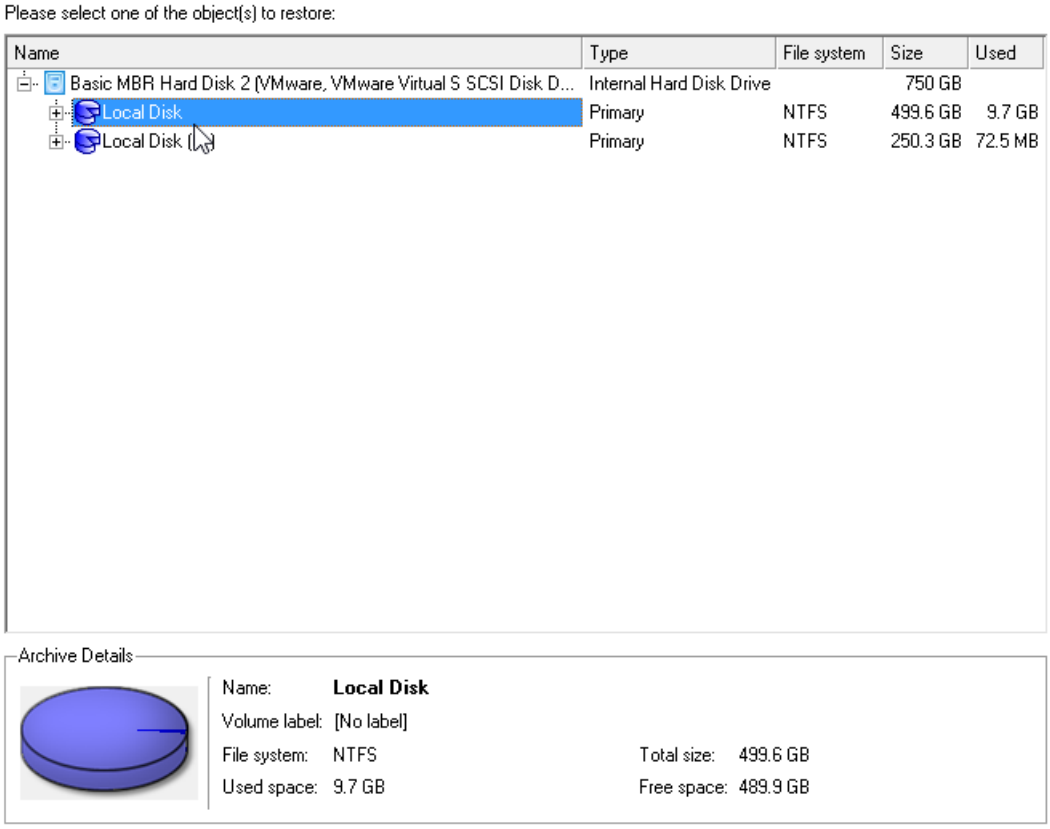
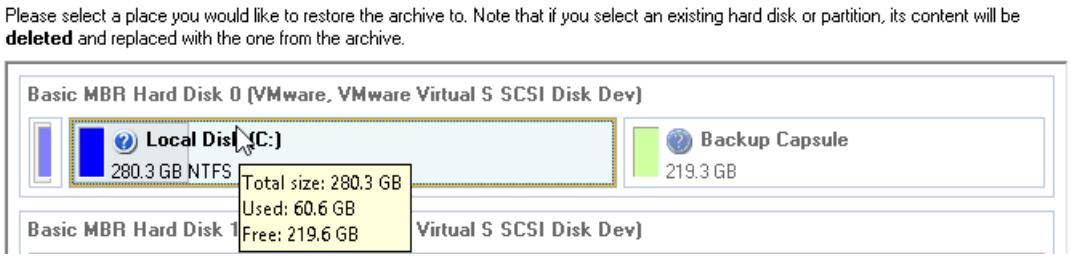


7. On the Where to Restore page specify a hard disk, then one of its partitions to restore the image to (if several in your computer). By default, the program offers to restore the archive exactly where it belongs. That's what we actually need.



All contents on the partition selected for restoring purposes will be deleted during the operation.

8. On the Restore Results page you can see the resulted disk layout. Besides there's the possibility to change size of the partition and its location if necessary as well as assign a particular drive letter. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the **Switch EFI to boot from destination drive** option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through Boot Corrector.

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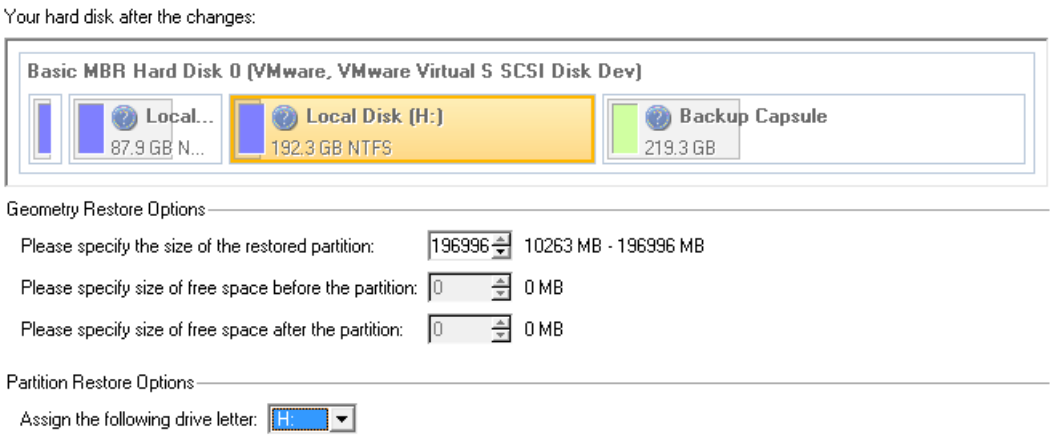

9. On the next page of the wizard confirm the operation by selecting the appropriate option.
10. In the Progress window you can see in real-time a detailed report on all actions carried out by the program. Mark the checkbox at the bottom of the window to automatically switch off the computer on the successful accomplishment of the restore operation.
11. After completing the operation close the wizard, and then reboot the computer.

Restoring a system partition from a local drive

Let's assume that your operating system gives trouble after having installed brand new software. But you've got a backup of the system partition on a local disk. That's just enough to easily roll it back to the point when run smoothly.

To restore your system partition from a backup image located on a local disk, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Restore**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. On the Restore Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page, specify the required archive:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).

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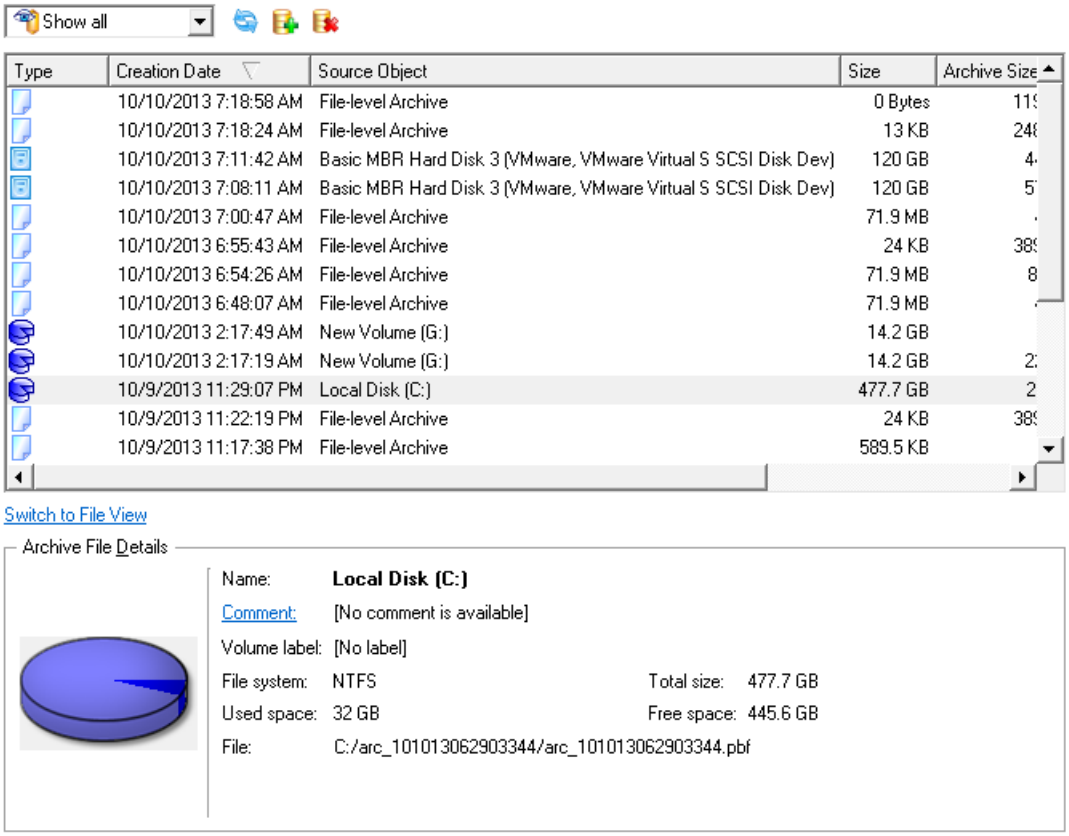

To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

- By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.

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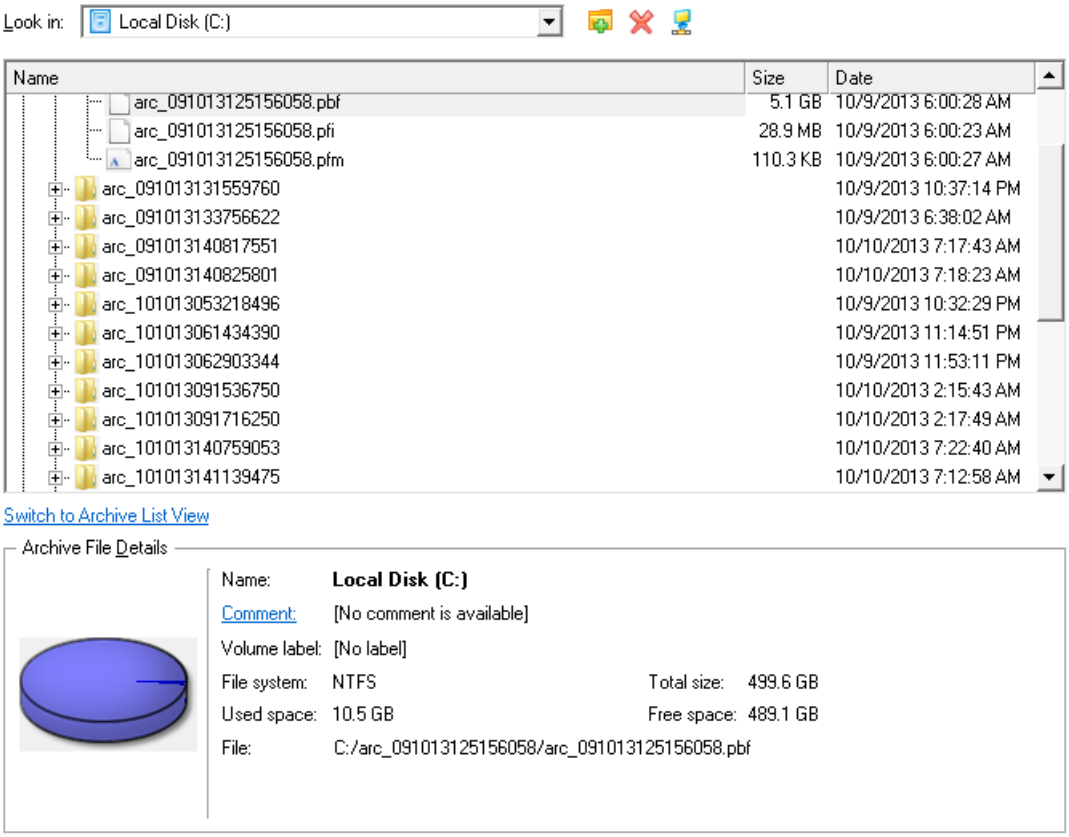
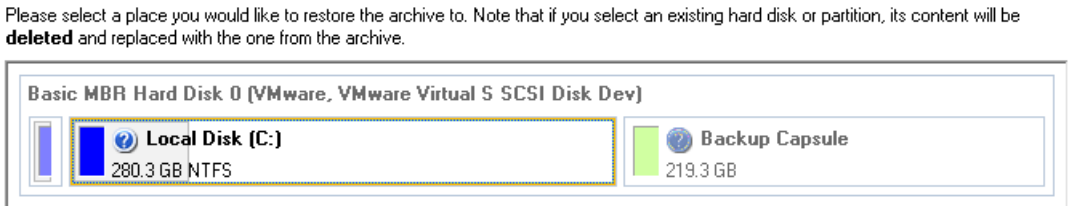


To know more on the subject, please consult the Viewing Image Properties chapter.

5. On the Where to Restore page specify a hard disk, then one of its partitions to restore the image to (if several in your computer). By default, the program offers to restore the archive exactly where it belongs. That's what we actually need.



All contents on the partition selected for restoring purposes will be deleted during the operation.

6. On the Restore Results page you can see the resulted disk layout. Besides there's the possibility to change size of the partition and its location if necessary as well as assign a particular drive letter.

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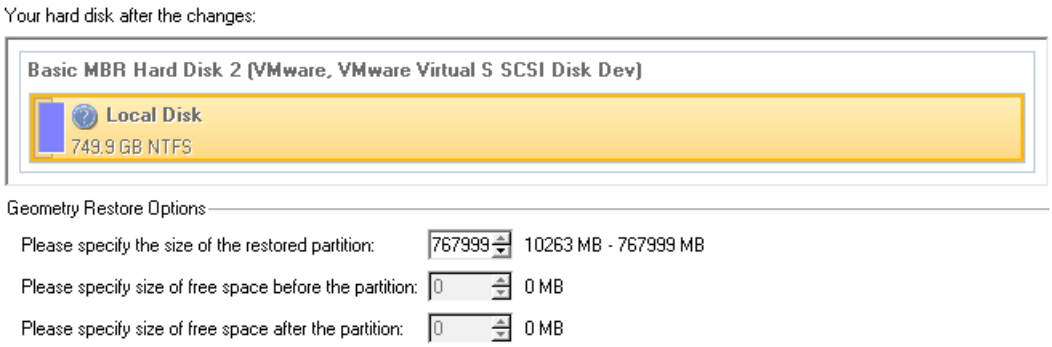

7. Complete the wizard and then apply the pending changes.
8. The program will require the system restart to accomplish the operation in a special boot-up mode. Click the appropriate button to agree.
9. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.

After completing the operation the program will automatically reboot the computer.

This operation can also be accomplished with our recovery media.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

Restoring a dual boot Mac from an external USB drive

Let's assume that your Mac fails to boot because of a hard disk malfunction. But you've got a backup of your hard disk on an external USB drive. Just replace the failed disk with a new one and carry out a bare metal restore.

To restore a dual boot Mac from a backup image located on an external USB drive, please do the following:

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

---

2. Connect an external USB drive to the computer.
3. Restart the computer.
4. In the boot menu select **Normal Mode** to use the Linux recovery environment, since it's the only mode that enables to work with USB devices.

By default the Normal Mode will be automatically initiated after a 10 second idle period.

---

5. In the Linux launch menu select the Simple Restore Wizard.
6. On the Wizard's Welcome page, click the Next button.

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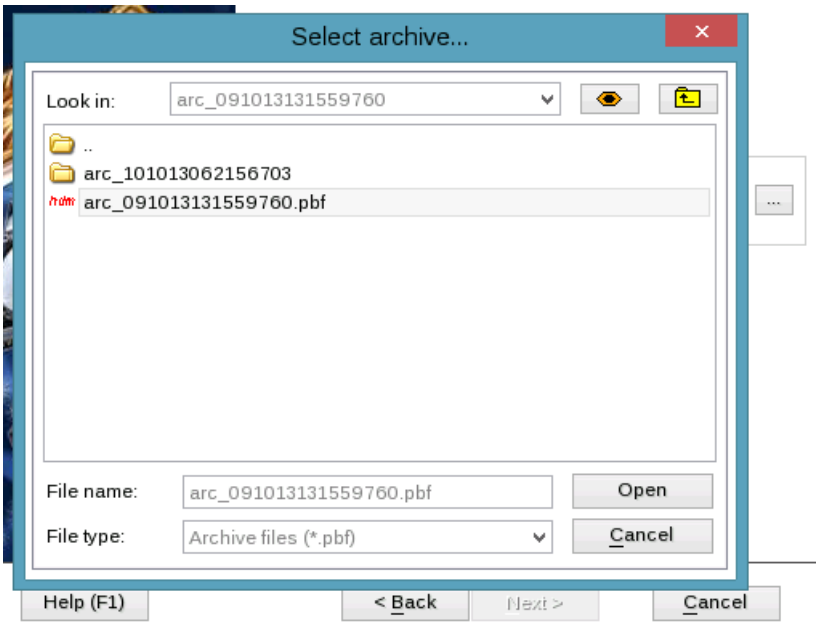
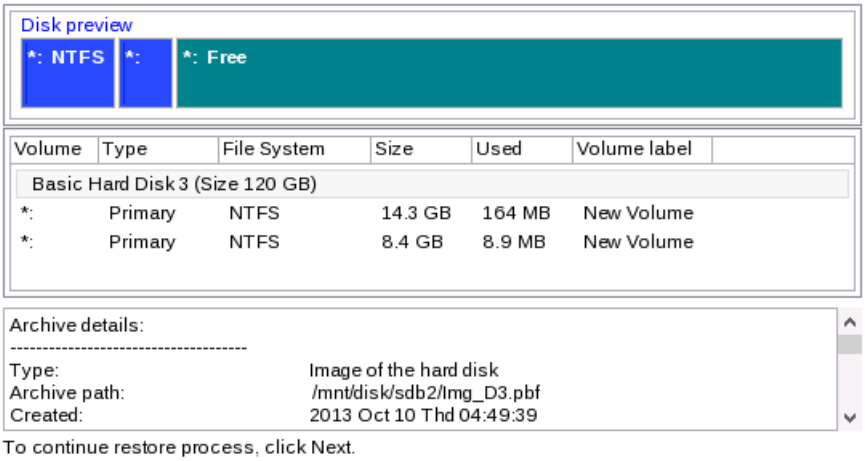
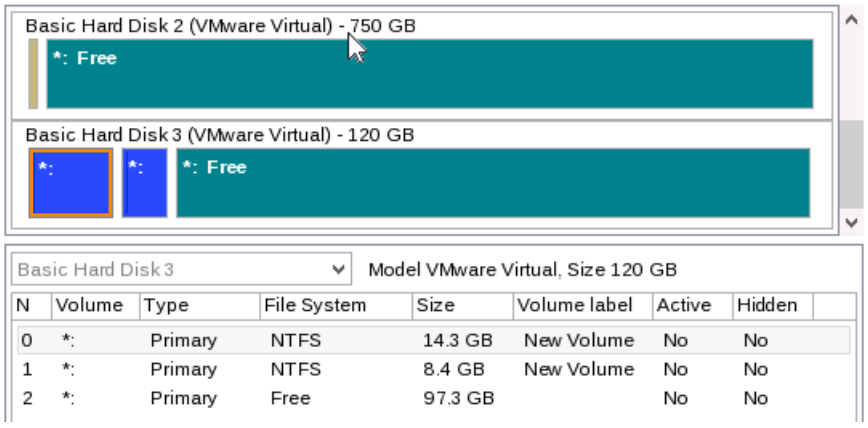
7. On the What to Restore page, click the standard browse button [...] to find the required archive. When done, double click on it to select.



8. On the Image Properties page, make sure that you select the correct image by viewing the provided information about the archive.



9. On the next page specify a hard disk to restore the image to.



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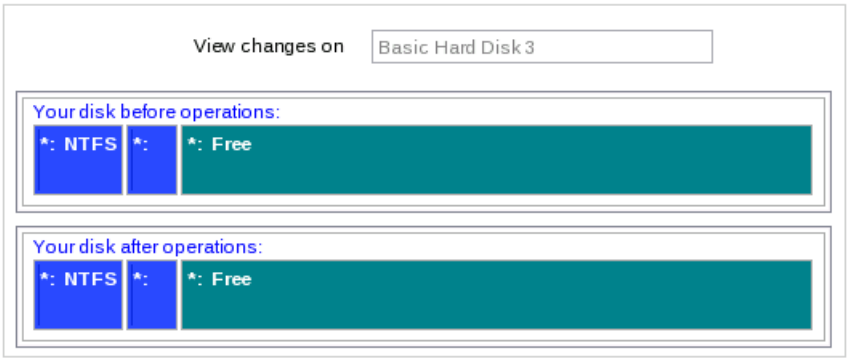
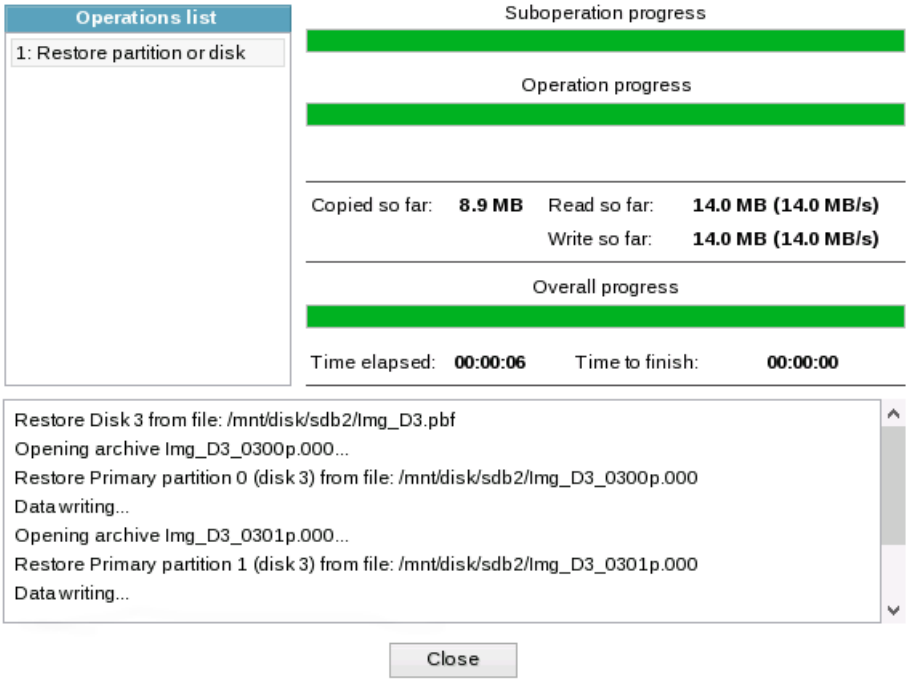
All contents on disk selected for restoring purposes will be deleted during the operation.

10. On the Restore Summary page you can see your hard disk layout before and after the operation. Click the Next button to initiate the restore process.



11. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.



12. After completing the operation close the wizard, and then reboot the computer.

Restoring a file increment

Let's assume that you're busy with developing some project and you make file increments of it on a day-to-day basis not to lose valuable information. So you've got a file backup chain. One day you understand that the job of the last three days is a complete and utter failure. Don't give up – recover your project to the state when everything's ok.

To restore a file increment, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Restore**.

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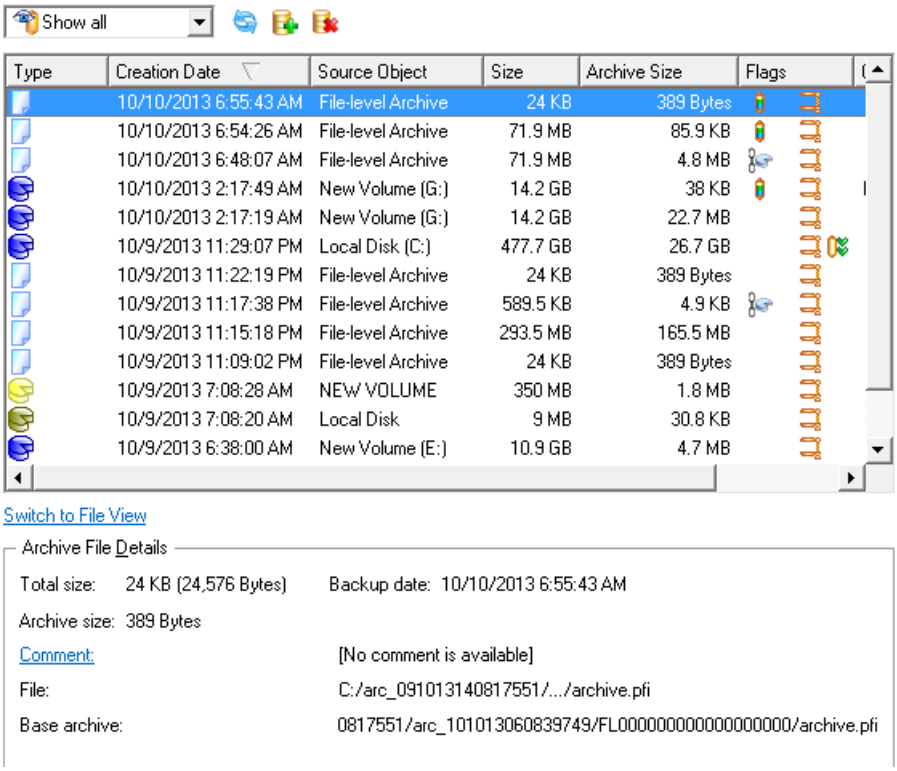
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. On the Restore Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page, specify the required file increment:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).



To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

   - By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.

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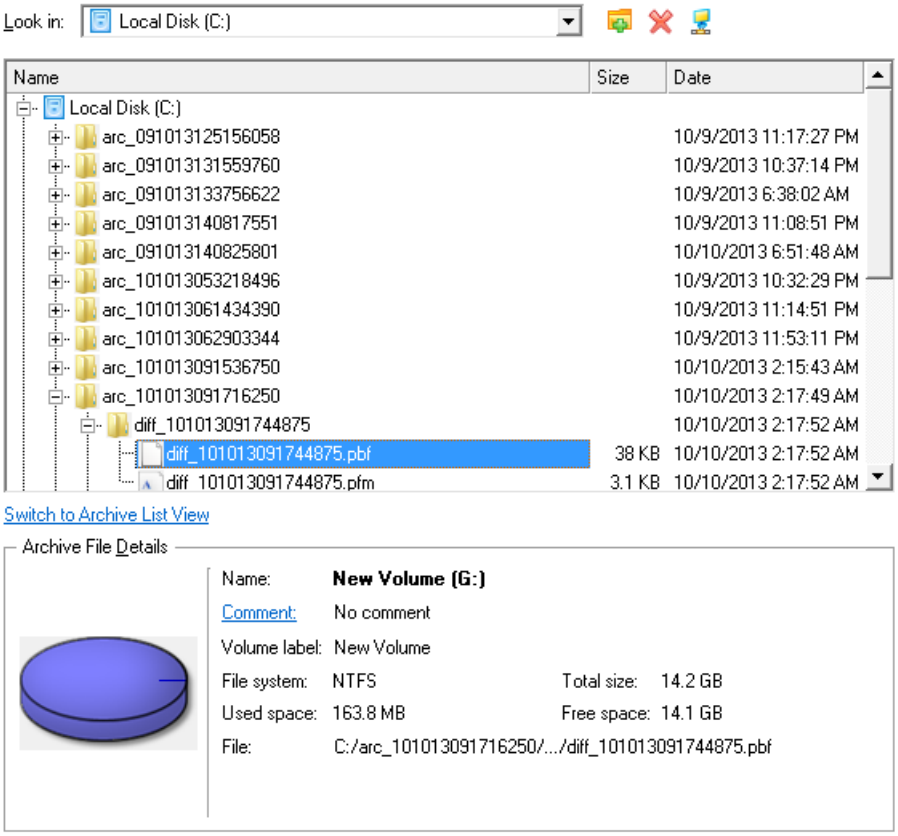
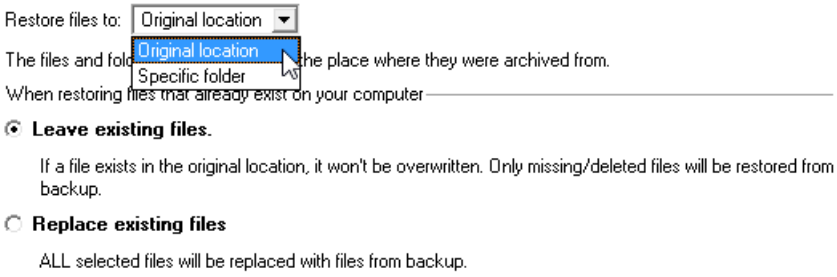


To know more on the subject, please consult the Viewing Image Properties chapter.

5. On the How to Restore page specify the way your archive will be restored. In our case we'd rather restore contents of the backup to its original location with replacing existing files as well.



6. Complete the wizard and then apply the pending changes.
7. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.

This operation can also be accomplished with our recovery media.

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Restoring a file increment to a partition backup

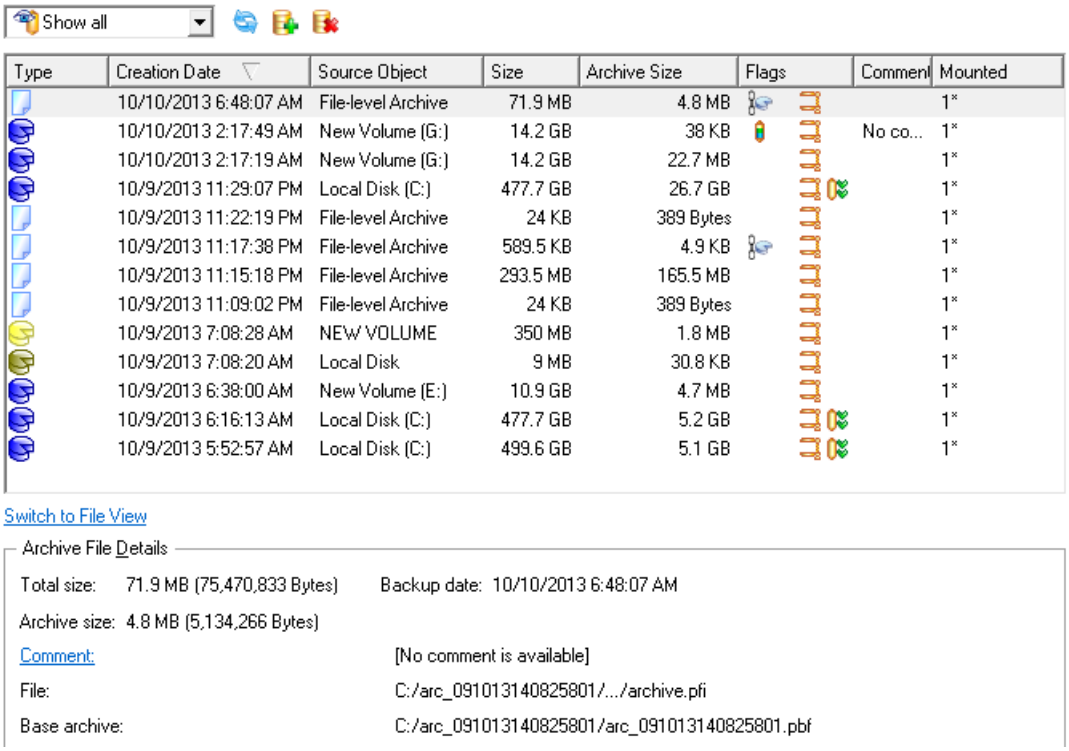
Let's assume that your operating system gives trouble because of a virus attack. But you've got a backup of your system partition on a local disk. Besides you make file increments of your documents and e-mail database to that backup on a regular basis. That's just enough to easily roll everything back to the point when run smoothly.

To restore your system partition with a file increment from a backup image located on a local disk, please do the following:

1. Enable the Legacy features view.
2. Click the **Backup & Restore** tab on the Ribbon Panel, then select **Restore**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

3. On the Restore Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page, specify the required file increment archive to your system partition backup:
   - By clicking the **Switch to Archive List View** link, you can see a list of images contained in the Archive Database (if any).



   To get a clear-cut picture on properties of the required image, just click on it and the section below will (i.e. Archive File Details) display a short description.

To know more on the subject, please consult the Viewing Image Properties chapter.

   - By clicking the **Switch to File View** link, you can find the required image in the browser-like window. The section below (i.e. Archive File Details) will also display a short description of the selected image.

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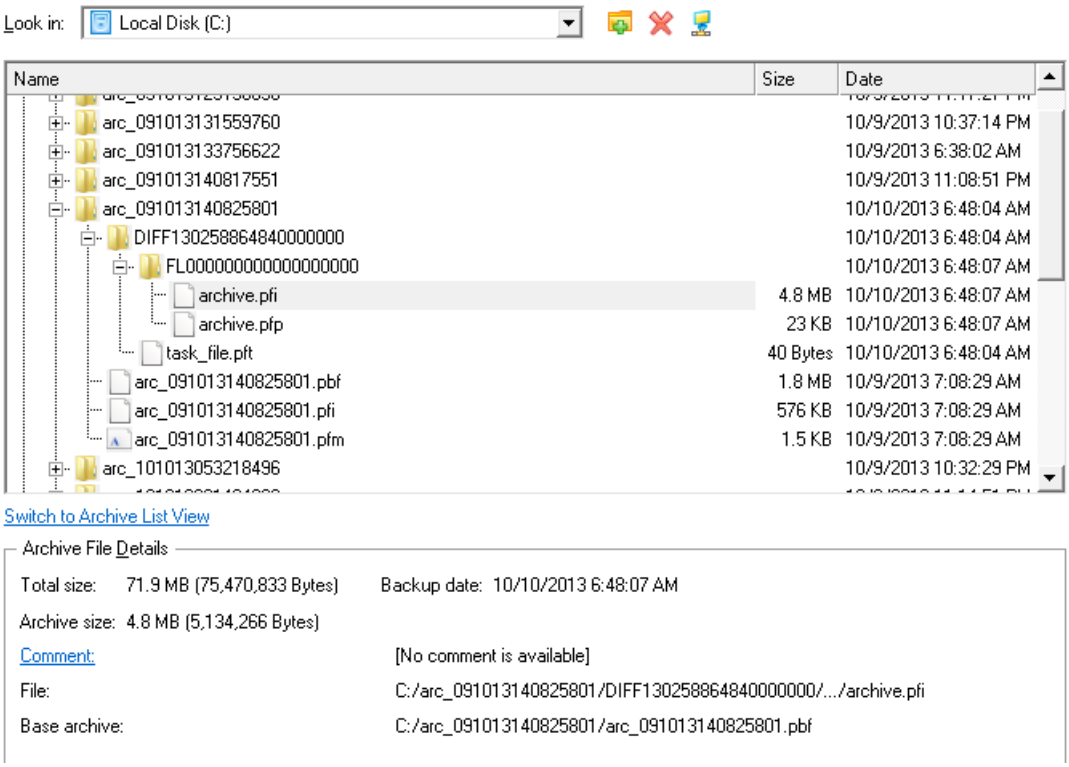
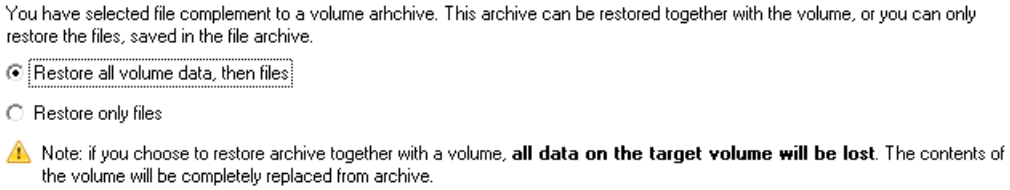
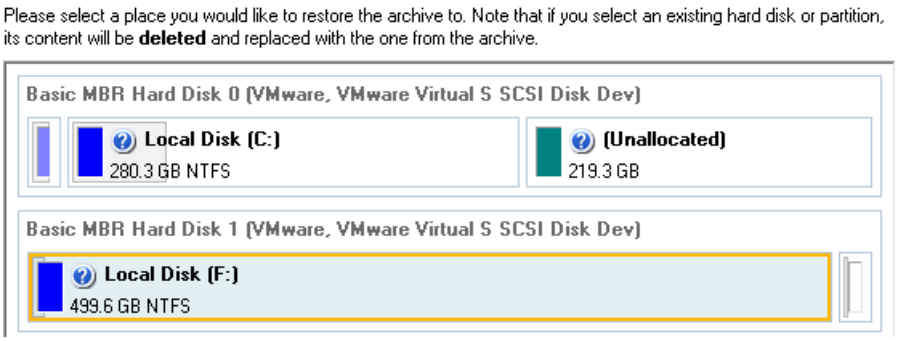


To know more on the subject, please consult the Viewing Image Properties chapter.

5. On the How to Restore File Complement page select whether you want to restore both, the partition archive and the desired file increment or just the file increment. In our case we choose the first option.



6. On the Where to Restore page specify a hard disk, then one of its partitions to restore the image to (if several in your computer). By default, the program offers to restore the archive exactly where it belongs. That's what we actually need.



All contents on the partition selected for restoring purposes will be deleted during the operation.

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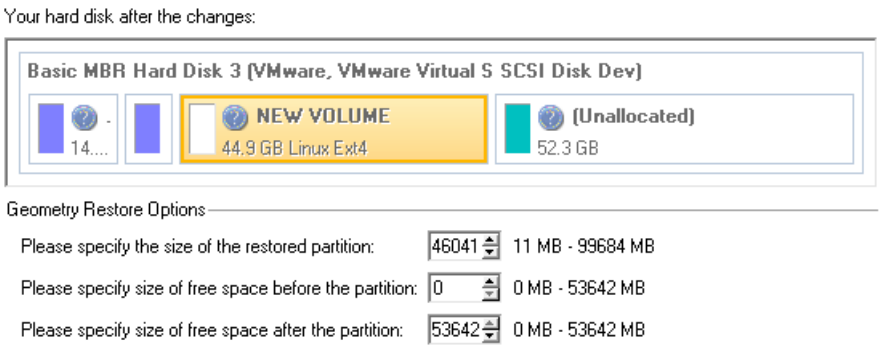
7. On the Restore Results page you can see the resulted disk layout. Besides there's the possibility to change size of the partition and its location if necessary as well as assign a particular drive letter.



8. Complete the wizard and then apply the pending changes.
9. The program will require the system restart to accomplish the operation in a special boot-up mode. Click the appropriate button to agree.
10. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.

After completing the operation the program will automatically reboot the computer.

This operation can also be accomplished with our recovery media.

Restoring separate files and folders from a backup

The program provides a very convenient option to access backup archives and restore only data you need (the so called selective restore functionality).

Restore Wizard

To restore separate files and folders from a backup image with the Restore Wizard, please do the following:

1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

---

2. Launch the **Restore Wizard**.
3. On the Restore Wizard's Welcome page, click the Next button.
4. On the Browse for Archive page choose the required archive in the browser-like window. The Archive File Details section displays a short description of the selected image.

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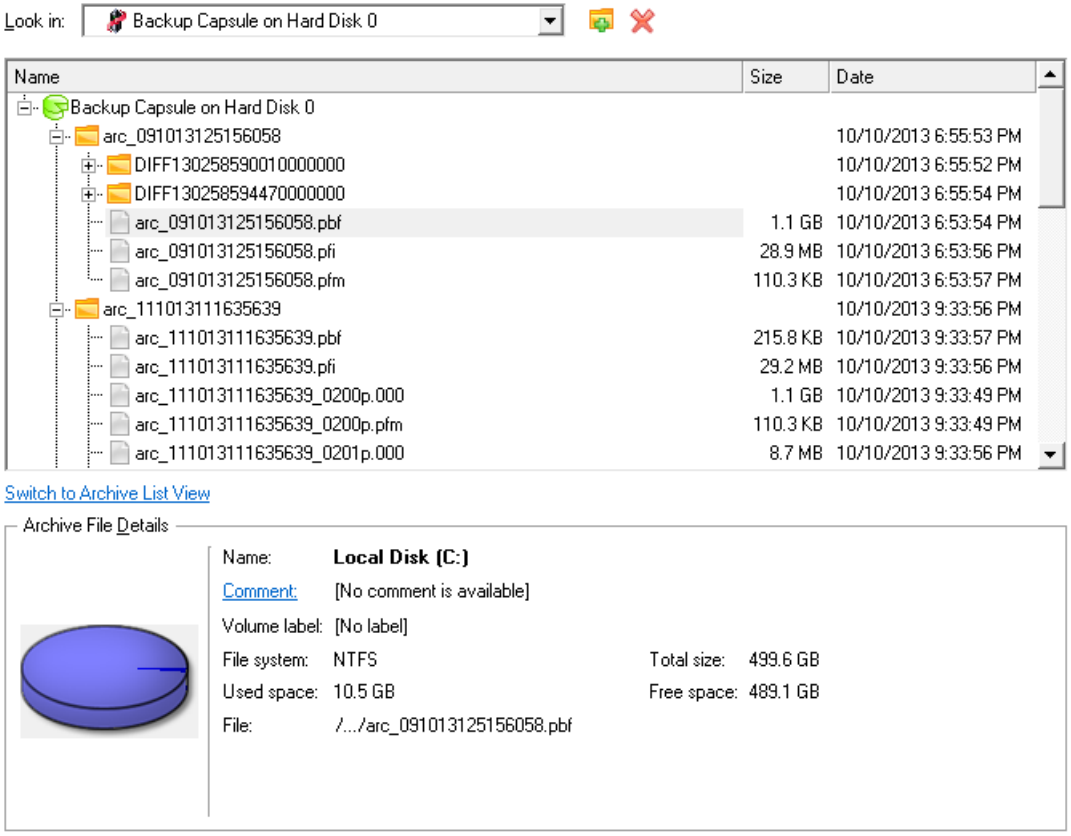
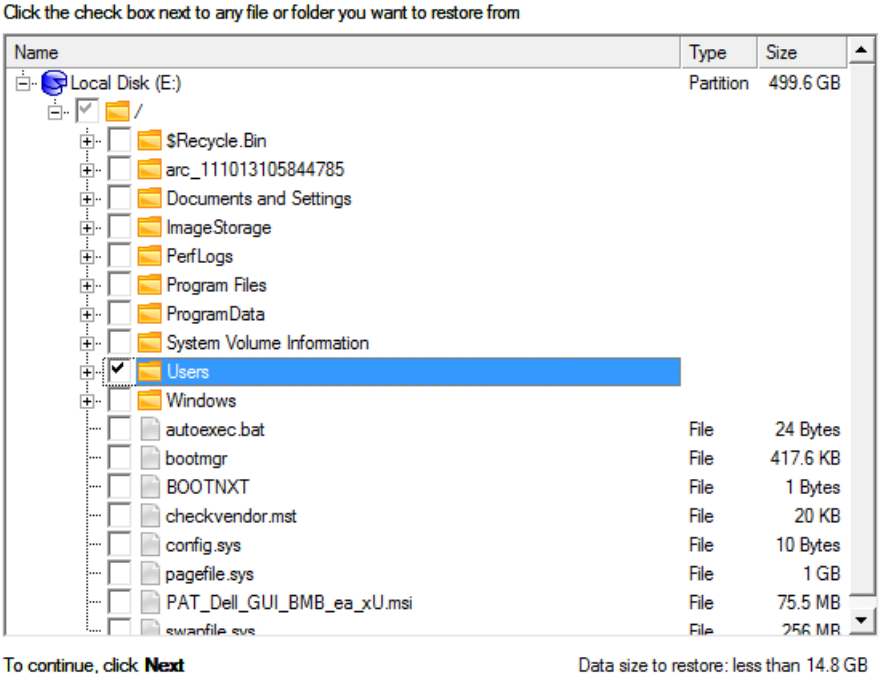


5. On the next page specify what you need to extract from the backup by marking checkboxes next to the required data items. At the right lower corner of the window you can see the resulted amount of the selected data.



6. On the How to Restore page specify the way the selected data will be restored. In our case we'd rather restore contents of the backup to its original location with replacing existing files as well.

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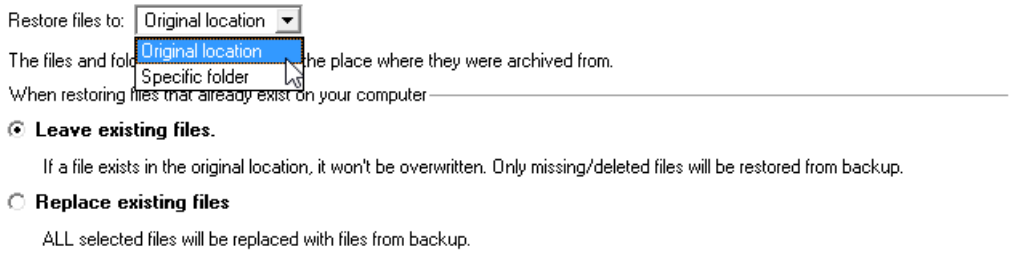
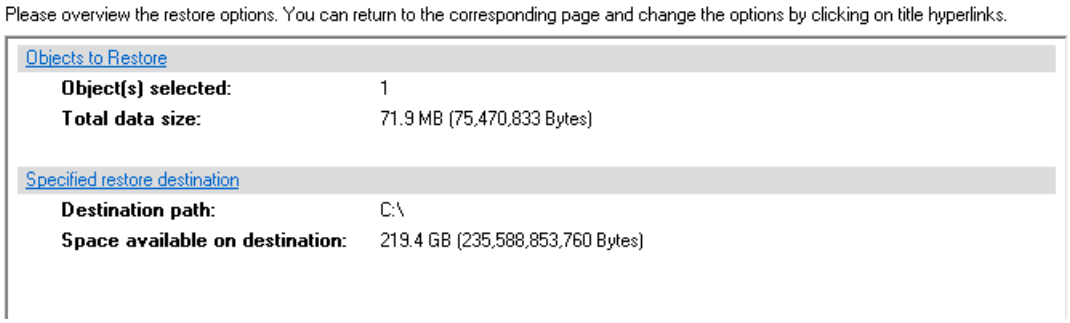


7. On the Restore Summary page review all parameters of the operation and modify them if necessary.



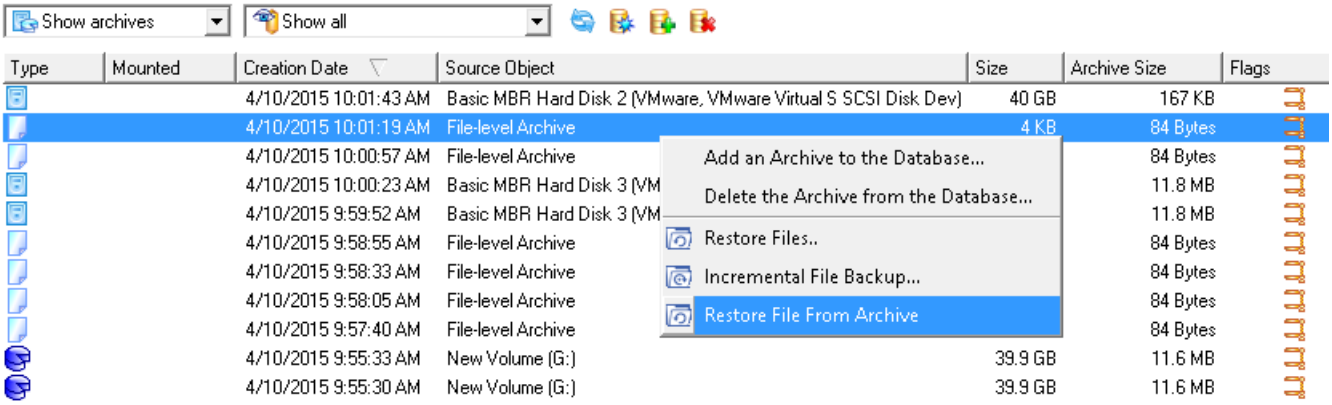
8. On the next page of the wizard confirm the operation by selecting the appropriate option.
9. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.
10. After completing the operation close the wizard, and then reboot the computer.

This operation can also be accomplished under Windows.

File Transfer Wizard

To restore separate files and folders from a backup image with the File Transfer Wizard, please do the following:

1. Call the popup menu for the required backup image (right click of the mouse button) in the Archive Database and then select the menu item: Restore File from Archive. Thus you automatically open it with the File Transfer Wizard.



2. Select files you want to copy and place them to Clipboard by pressing the left arrow-button.

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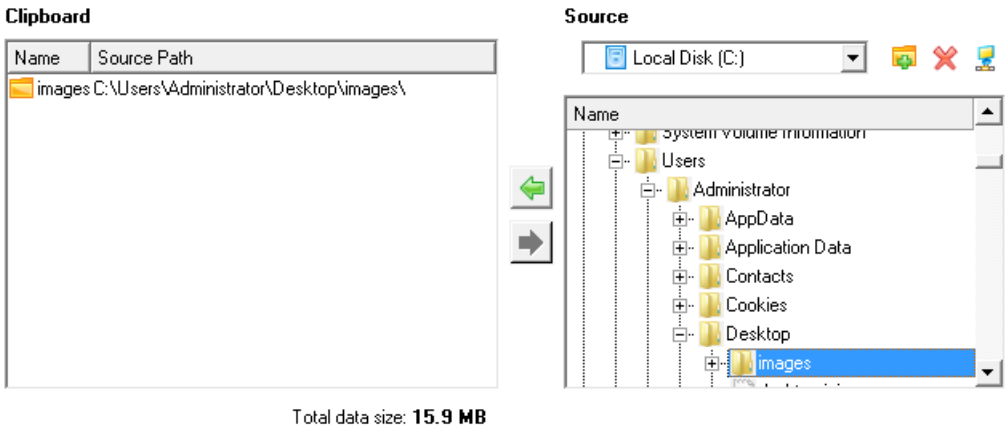
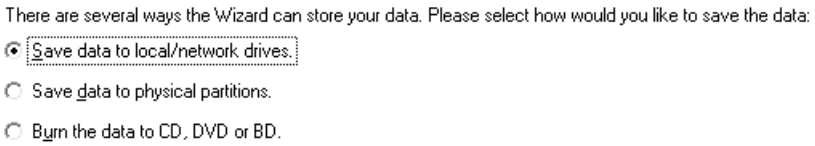
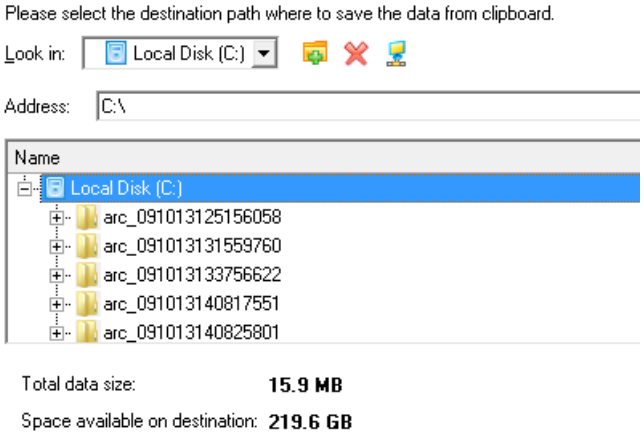


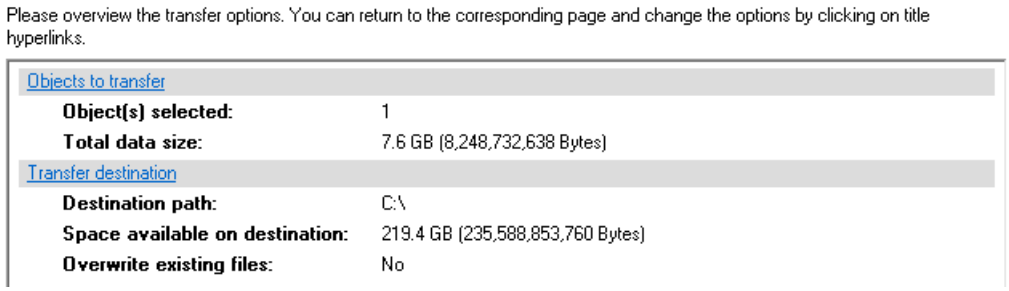
3. On the Select Destination Type, choose the way the data will be stored. Select the **Save data to any local drive or a network share** item.



4. On the Select Destination Path page, specify the exact place to copy the data to.



5. On the Transfer Summary page check all parameters of the operation. Click the Next button to accomplish the operation.



6. After the operation is completed, close the wizard by pressing the appropriate button.

Volume Explorer

To restore separate files and folders from a backup image with Volume Explorer, please do the following:

1. Click the **Volume Explorer** tab on the Ribbon Panel;

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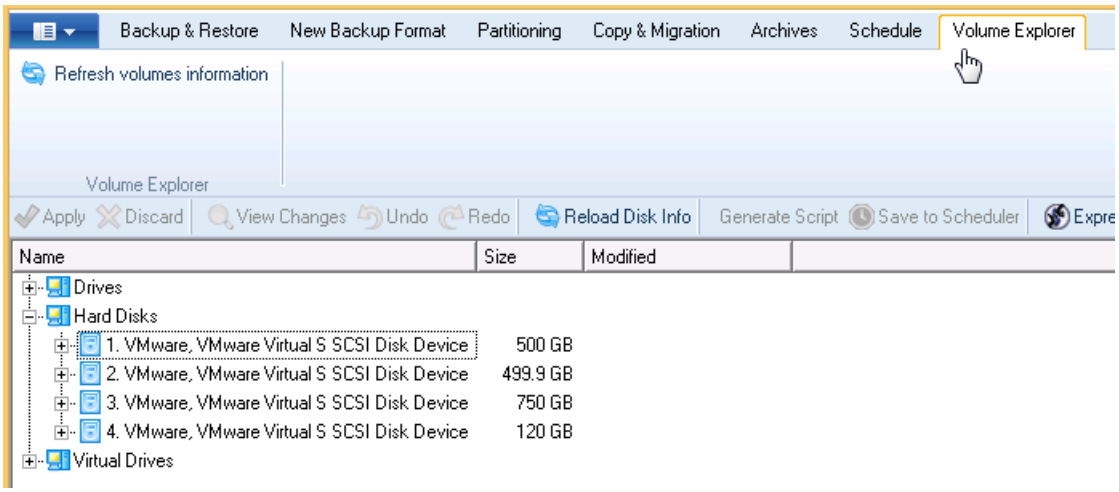
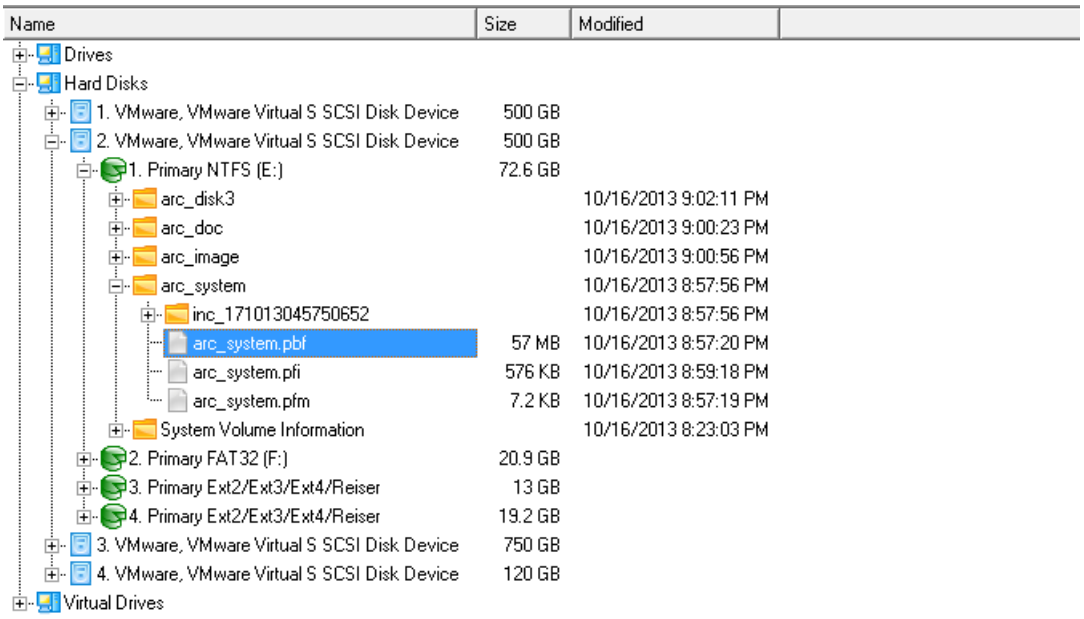
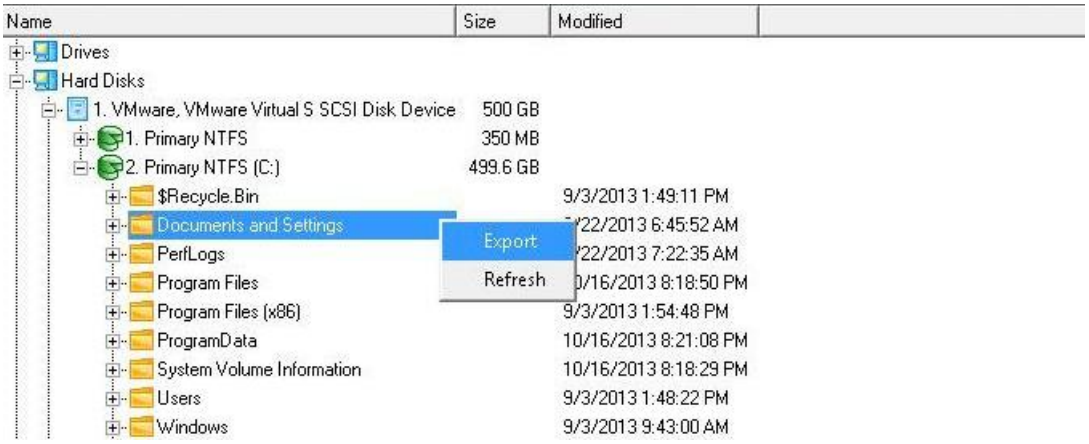


2. Browse for the required archive and then open it by double click of the left mouse button.



3. Call a context menu (right click of the mouse button) for a file/folder you need and then select the Export item.



4. Select a place on the disk where the file/folder will be extracted to.

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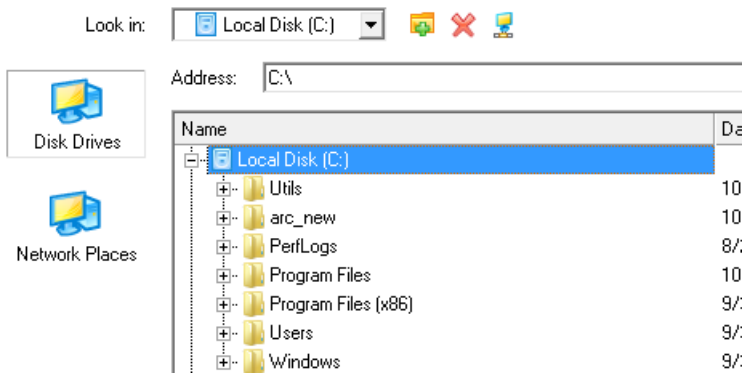


5. Click the OK button to accomplish the operation.

The current version of the program does not enable to access virtual containers and file archives with Volume Explorer.

Fixing Boot Problems without Restore

Correcting EFI parameters

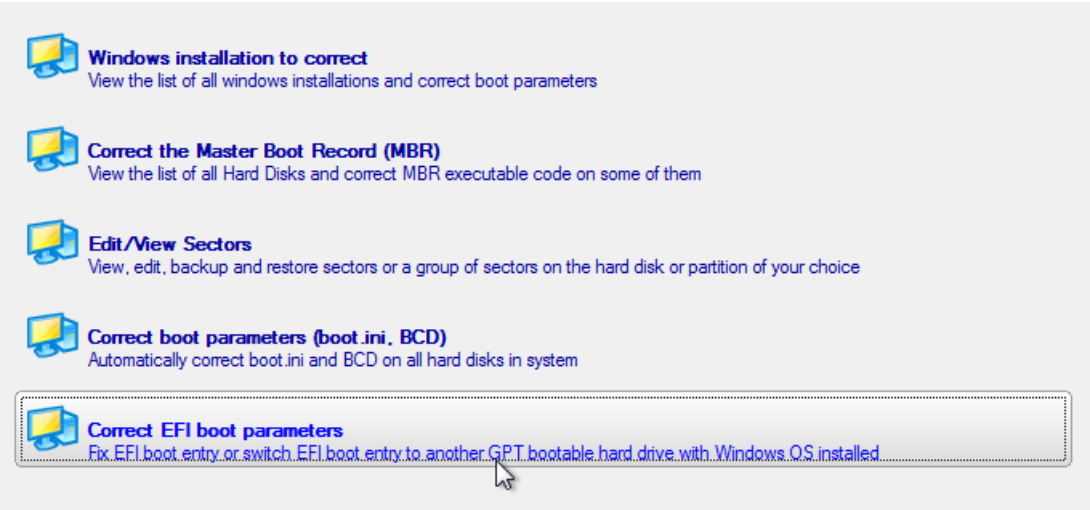
To specify a bootable device in the EFI boot entry, please do the following:

1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. Launch **Boot Corrector**.
3. On the Wizard's Welcome page, click the Next button.
4. Select **Correct EFI parameters** to specify the required bootable device in the EFI boot entry.



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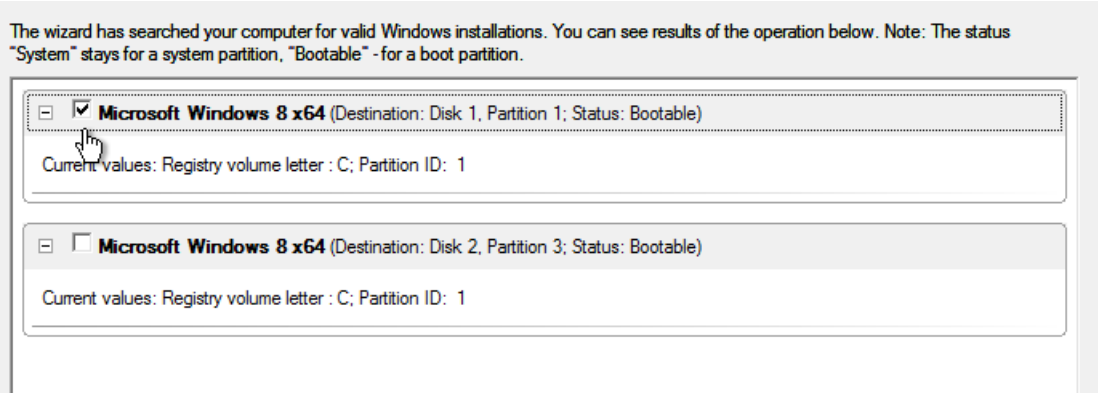
The option above will be available for the user, only if the operation is accomplished through the 64-bit WinPE media.

5. The wizard will detect and list all available GPT partitions that accommodate 64-bit Windows OS. Choose the one you need to boot from, to let the wizard modify the EFI boot entry correspondingly.



6. Confirm the operation.
7. Click the **Finish** button to close **Boot Corrector**.
8. Restart the computer.

Correcting BCD (Boot Configuration Data)

To automatically correct Windows BCD, please do the following:

1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. Launch **Boot Corrector**.
3. On the Wizard's Welcome page, click the Next button.
4. Select **Correct boot parameters…** to let the wizard fix BCD in all found Windows installations.

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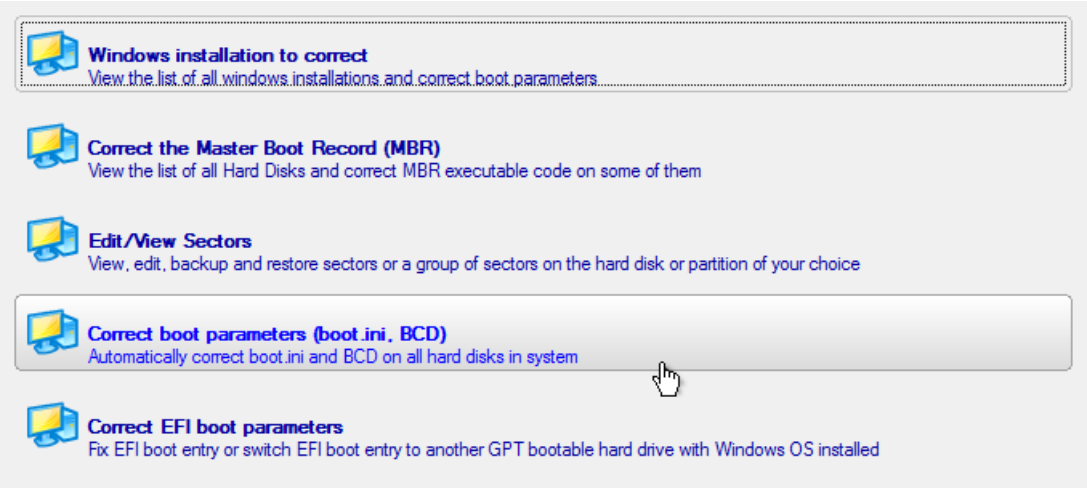

5. Confirm the operation.
6. Click the **Finish** button to close **Boot Corrector**.
7. Restart the computer.

Fixing Windows startup ability

Let's assume that due to an unknown reason your Windows fails to complete the startup procedure. At first everything seems quite OK, you can see the standard startup messages on the screen, but at some moment it hangs up.

To fix your Windows startup ability, please do the following:

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. In the boot menu select **Normal Mode** to use the Linux recovery environment (more preferable) or **Safe Mode** to use the PTS DOS recovery environment (in case you've got problems with Linux). Moreover you've got the option to boot into the **Low-Graphics Safe Mode** (PTS DOS safe mode) to cope with a serious hardware incompatibility. In this case, only the minimal set of drivers will be included, like hard disk, monitor, and keyboard drivers. This mode has simple graphics and a simple menu.

By default the Normal Mode will be automatically initiated after a 10 second idle period.

3. In the Linux launch menu select Boot Corrector. You can find it in PTS DOS as well.
4. On the Wizard's Welcome page, select the **Search for Windows installations to correct** option.

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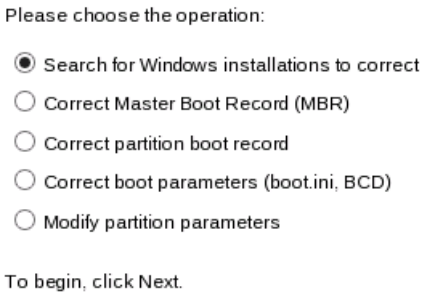
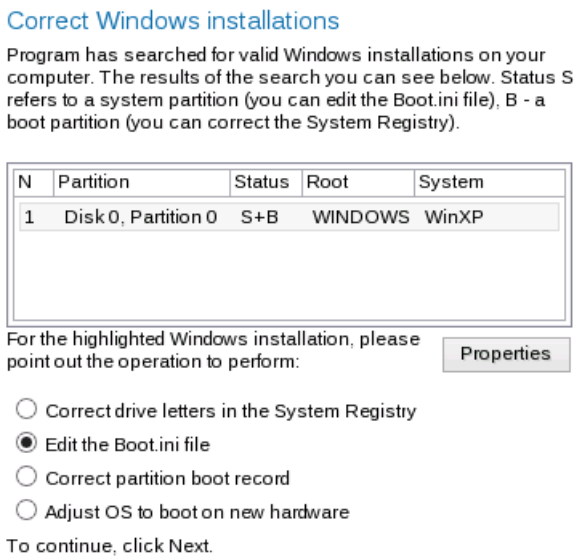
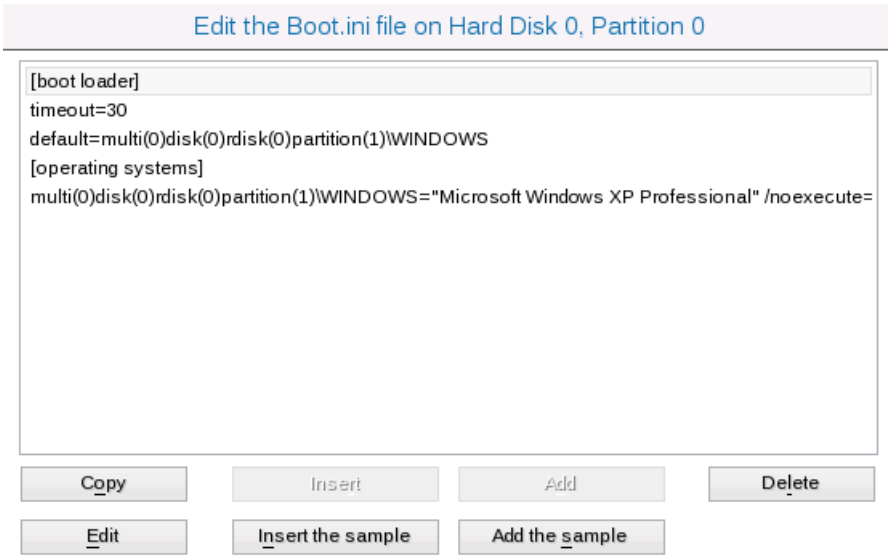


5. On the next page choose the required Windows installation from the list of found installations (if several), then select the **Edit the Boot.ini file** option. If you're not sure which installation you need, please use the Properties button to get more info on the selected item.



6. Examine the file – maybe that's where the problem is. If it contains a mistake, correct it by using the appropriate buttons.



7. If the Boot.ini file does not contain any mistake, please return to the Correct Windows Installations page to correct drive letters in the Windows System Registry.

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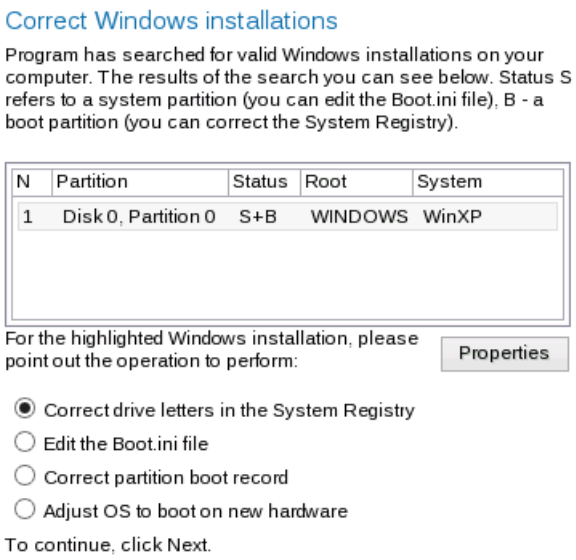
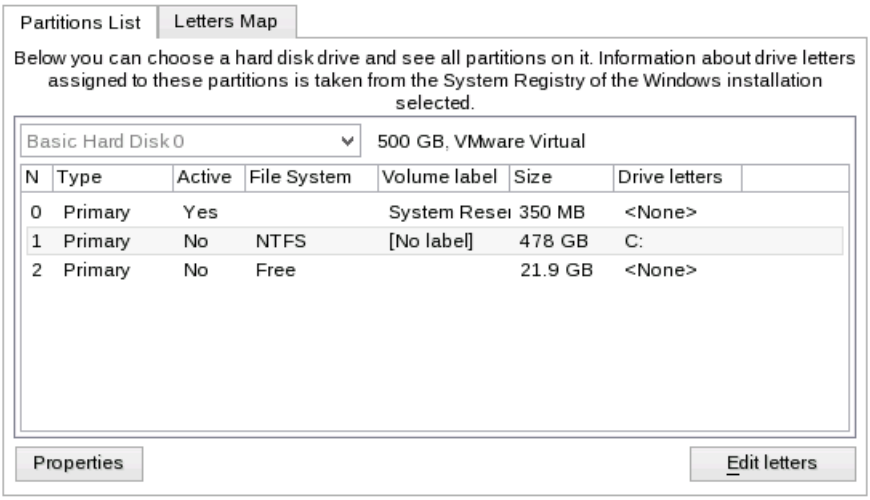
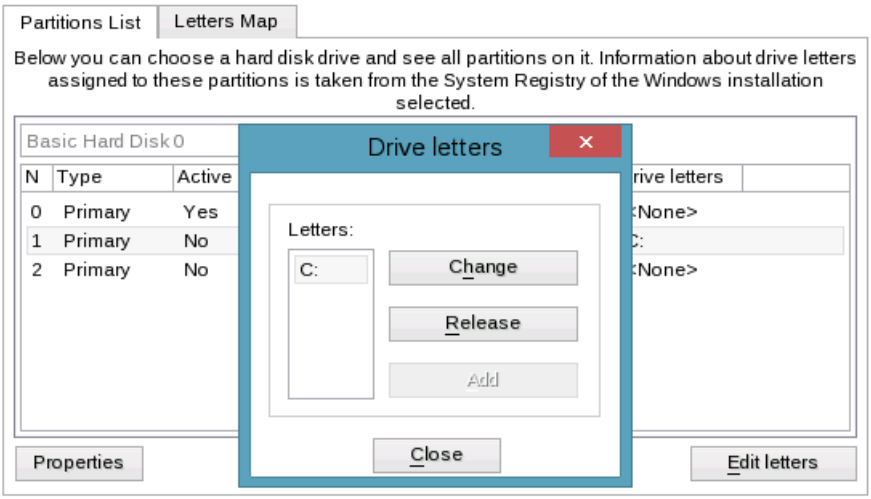


8. On the next page choose a hard disk from the pull-down list (if several), then the required partition. If you're not sure which installation you need, please use the Properties button to get more info on the selected item.



9. Click the Edit Letters button to correct an existing drive letter or assign a new one in the Windows System Registry.



10. Once you've assigned the appropriate drive letter, close the dialog, then click the Apply button.
11. Confirm the operation.

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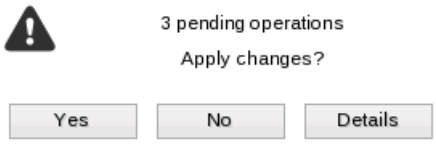
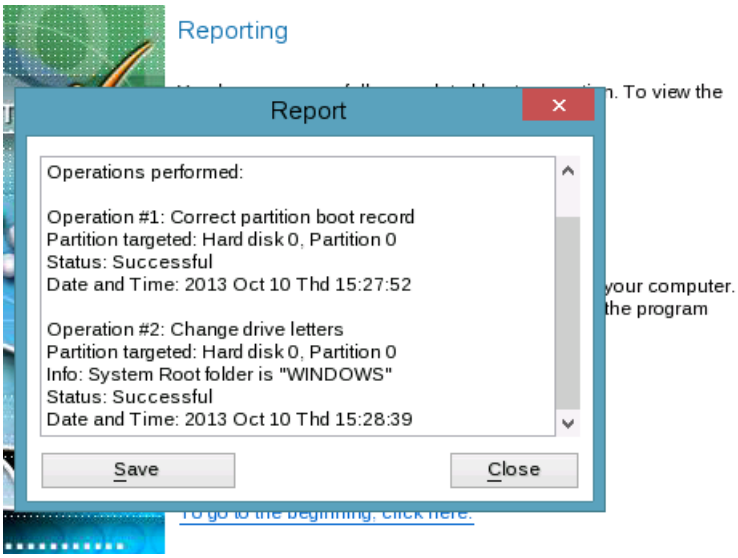


12. After the operation is completed click the Report button to see a well informative summary page. The program also enables to store the resulted report. To do that, just press the Save button and choose the exact location in the opened dialog.



13. Click the Finish button to close Boot Corrector.
14. Reboot the computer.

Retrieving/Transferring Individual Files and Folders

Copying of data from the corrupted system disk to another hard disk

To retrieve valuable information from your hard disk and copy it to another hard disk when the system fails to boot, please do the following:

1. Connect the second hard disk to the computer.
2. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

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3. In the boot menu select **Normal Mode** to use the Linux recovery environment (more preferable) or **Safe Mode** to use the PTS DOS recovery environment (in case you've got problems with Linux). Moreover you've got the option to boot into the **Low-Graphics Safe Mode** (PTS DOS safe mode) to cope with a serious hardware incompatibility. In this case, only the minimal set of drivers will be included, like hard disk, monitor, and keyboard drivers. This mode has simple graphics and a simple menu.

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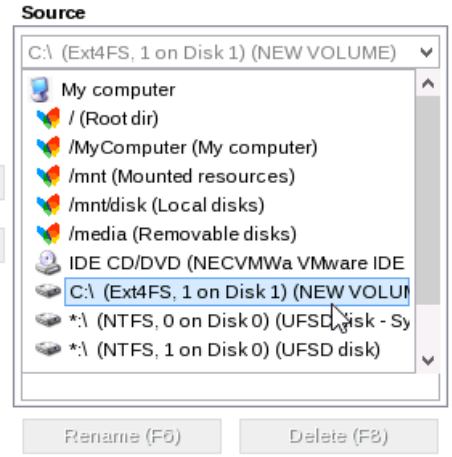
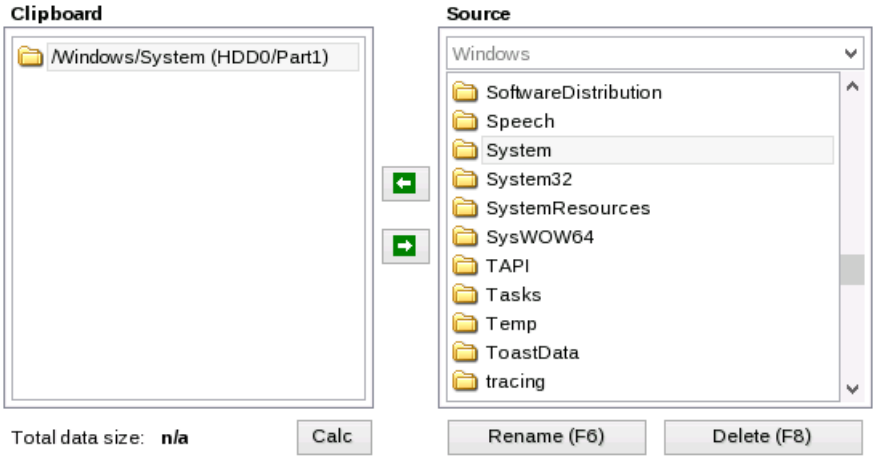
By default the Normal Mode will be automatically initiated after a 10 second idle period.

4. In the Linux launch menu select the File Transfer Wizard. You can find the same wizard in PTS DOS as well.
5. On the Wizard's Welcome page, click the Next button.
6. Select a disk where the files you need are stored from the pull-down list in the right pane of the page.

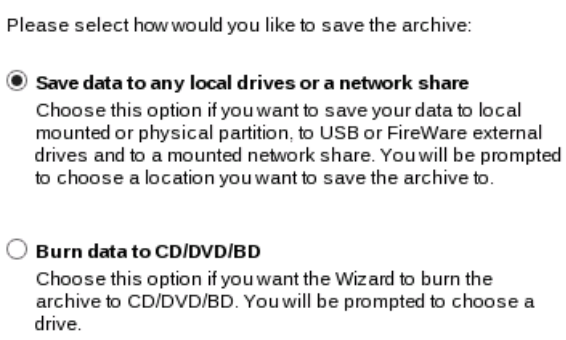


7. Select files you want to copy and place them to Clipboard by pressing the left arrow-button.



Click the Calc button to estimate the resulted data size.

8. On the Select Destination Type, choose the way the data will be stored. Select the **Save data to any local drive or a network share** item.



9. On the Select Destination Path page, select a hard disk to copy the data to by pressing the standard browse button [...].

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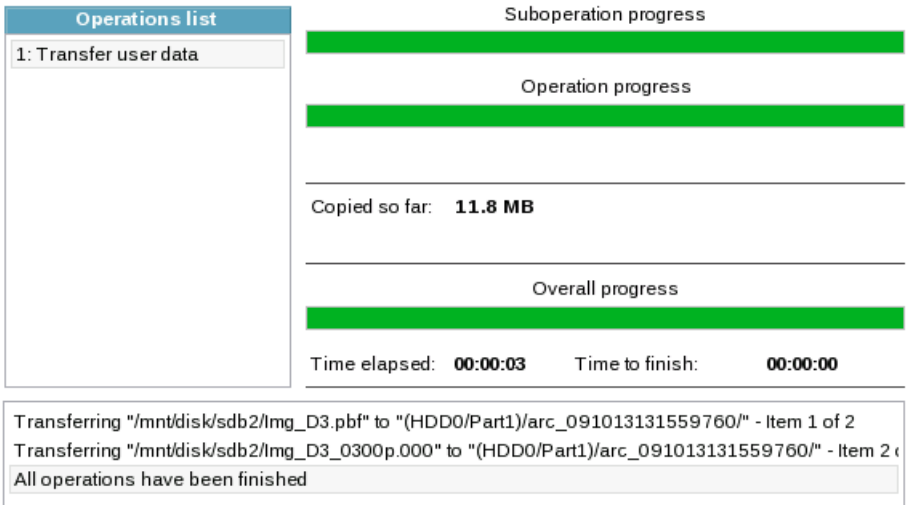
10. On the Transfer Summary page check all parameters of the operation. Click the Next button to accomplish the operation.
11. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.



12. After the operation is completed, close the wizard by pressing the appropriate button.
13. Turn off the computer.

This operation can also be accomplished with our recovery media.

Burning of data from the corrupted system disk to CD/DVD

To retrieve valuable information from your hard disk and burn it to CD/DVD when the system fails to boot, please do the following:

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. In the boot menu select **Normal Mode** to use the Linux recovery environment, since it's the only mode that enables to burn CD/DVD discs.

By default the Normal Mode will be automatically initiated after a 10 second idle period.

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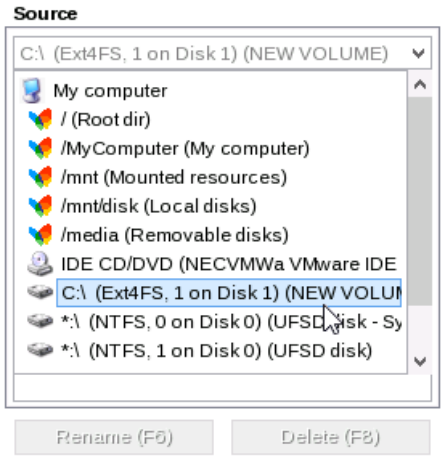
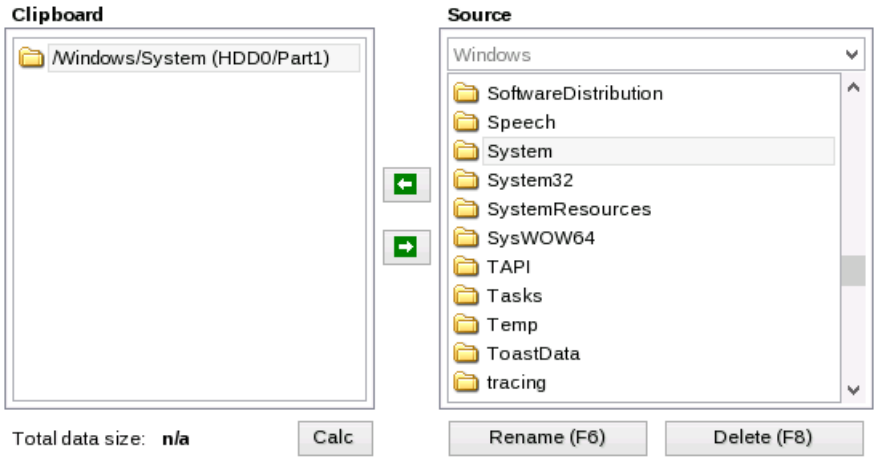
3. In the Linux launch menu select the File Transfer Wizard. You can find the same wizard in PTS DOS as well.
4. On the Wizard's Welcome page, click the Next button.
5. Select a disk where the files you need are stored from the pull-down list in the right pane of the page.

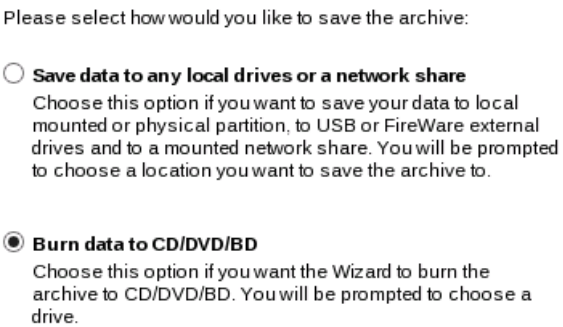


6. Select files you want to copy and place them to Clipboard by pressing the left arrow-button.



Click the Calc button to estimate the resulted data size.

7. On the Select Destination Type, choose the way the data will be stored. Select the **Burn data to CD/DVD** item.



8. On the Choose a Recorder page, select a recorder from the list of available devices and then set a volume label by entering it in the appropriate field.

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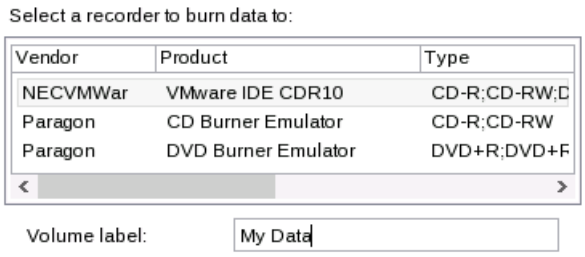
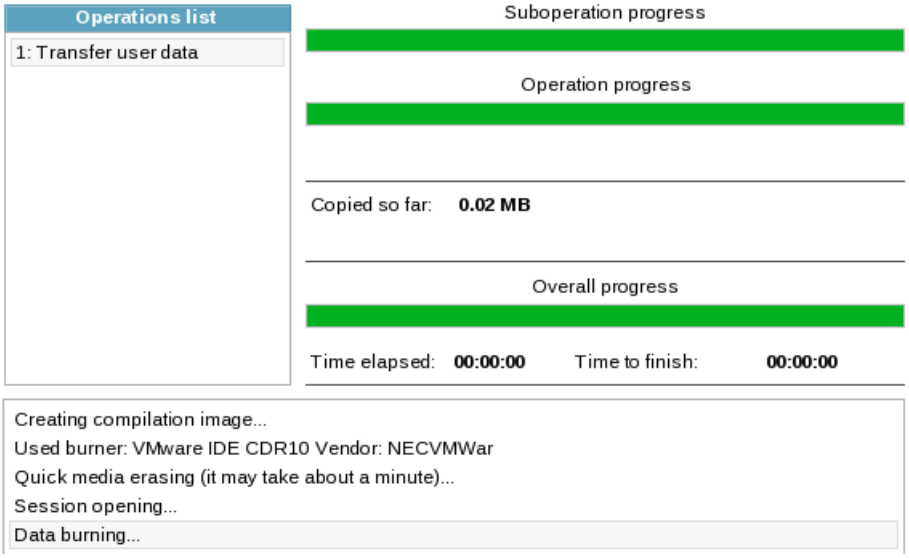


9. On the Transfer Summary page check all parameters of the operation. Click the Next button to accomplish the operation.
10. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.



11. After the operation is completed, close the wizard by pressing the appropriate button.
12. Turn off the computer.

This operation can also be accomplished with our recovery media.

Copying of data from a backup to the corrupted system partition

The system fails to boot since some files are damaged. If you have a backup of the system partition, you can recopy these files to make the system be operable again:

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. In the boot menu select **Normal Mode** to use the Linux recovery environment (more preferable) or **Safe Mode** to use the PTS DOS recovery environment (in case you've got problems with Linux). Moreover you've got the option to boot into the **Low-Graphics Safe Mode** (PTS DOS safe mode) to cope with a serious hardware

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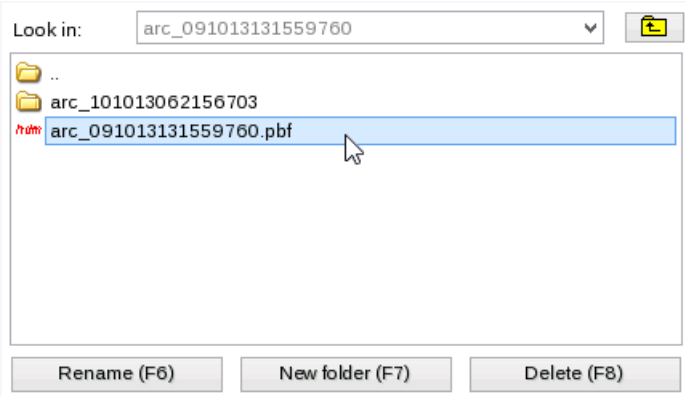
incompatibility. In this case, only the minimal set of drivers will be included, like hard disk, monitor, and keyboard drivers. This mode has simple graphics and a simple menu.

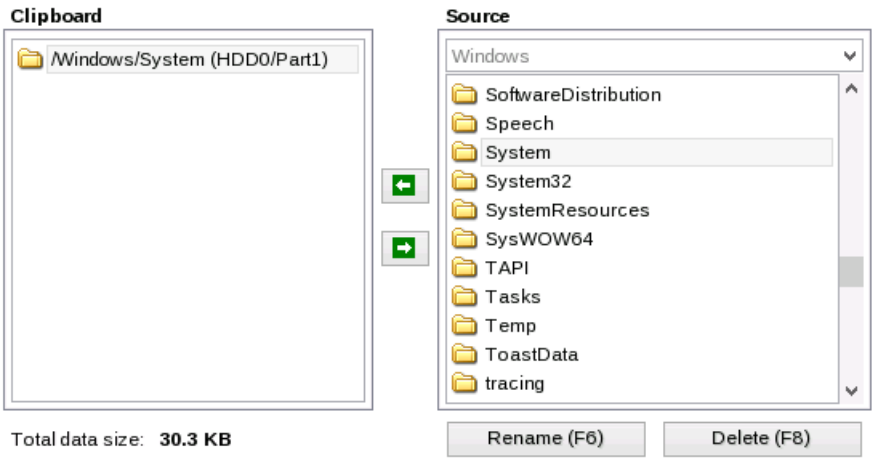
By default the Normal Mode will be automatically initiated after a 10 second idle period.

3. In the Linux launch menu select the File Transfer Wizard. You can find the same wizard in PTS DOS as well.
4. On the Wizard's Welcome page, click the Next button.
5. Select a disk where the system backup is stored from the pull-down list in the right pane of the page.



6. Double click on the required backup to open.

7. Select files you want to copy and place them to Clipboard by pressing the left arrow-button.



Click the Calc button to estimate the resulted data size.

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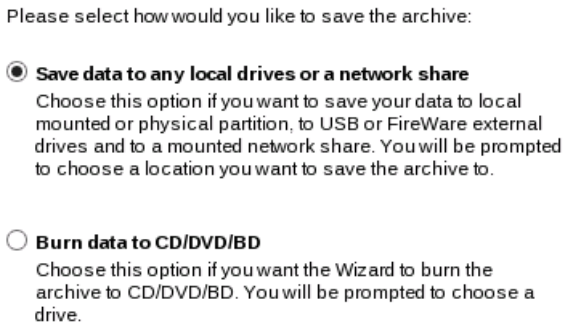
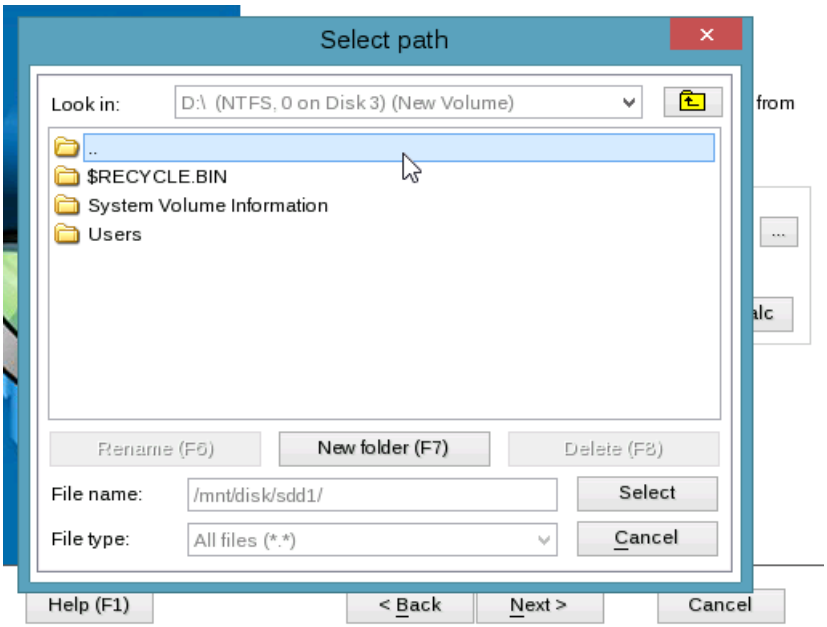
8. On the Select Destination Type, choose the way the data will be stored. Select the **Save data to any local drive or a network share** item.

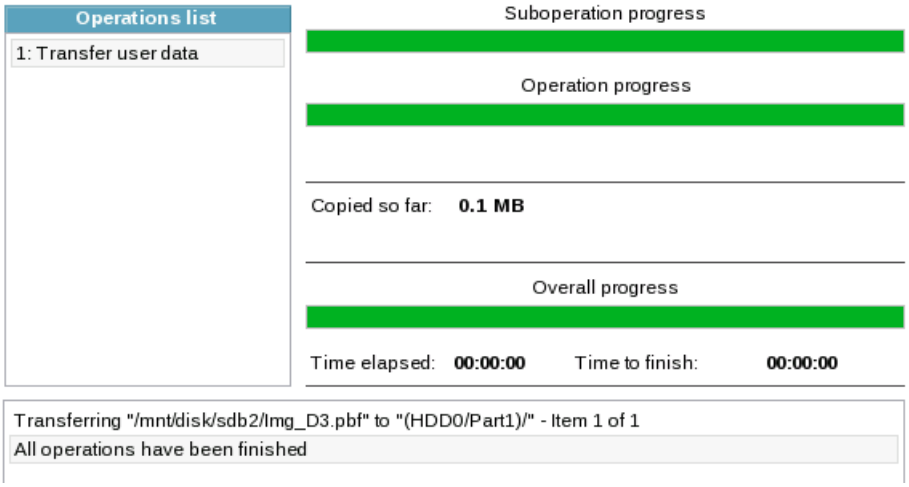


9. On the Select Destination Path page, select your system disk to copy the data to by pressing the standard browse button [...].



10. On the Transfer Summary page check all parameters of the operation. Click the Next button to accomplish the operation.

11. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.



12. After the operation is completed, close the wizard by pressing the appropriate button.

13. Turn off the computer.

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This operation can also be accomplished with our recovery media.

Resize Scenarios

Creating a new partition to detach operating system from the rest of data

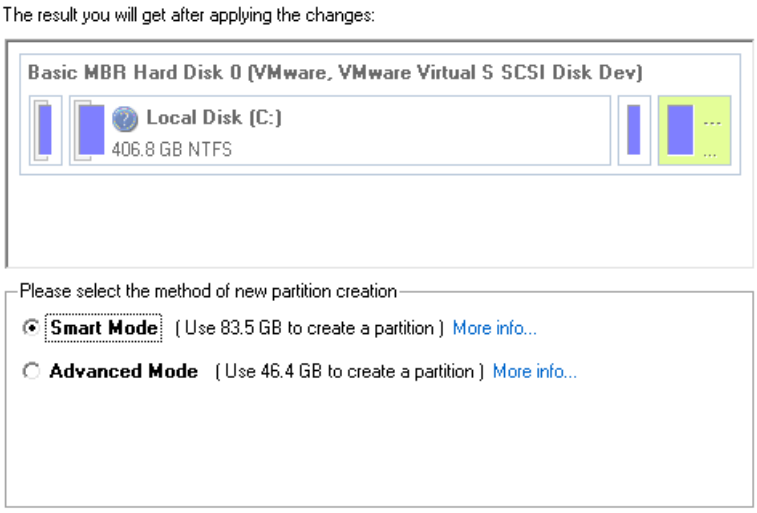
Let's assume that you're a rank and file user who is most likely to have only one hard disk with only one partition (the only partition is always system). To secure yourself against a system malfunction or a virus attack you've got nothing to do, but make a backup of the whole partition, which besides the operating system itself contains all your family photos, favorite films and music, program distributives, whatever. As a result you'll get a very huge backup image. You can easily tackle this issue however by detaching your operating system from the rest of data.

To create a new partition on your hard disk, please do the following:

1. Click the **Partitioning** tab on the Ribbon Panel, then select **Express Create**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the Next button.
3. Choose a method you find the most suitable to create the partition. The wizard is especially designed to minimize your participation in finding an appropriate place for it and its resulted size. The only thing you're to do is to choose between several modes. The most relevant thing here is the amount of space that will be allocated for that partition. For easy perception, you can see the resulted disk layout on the disk map by selecting this or that mode.



The number of available methods depends on your disk layout.

To learn more on the way the wizard works, please click the corresponding link on the first page of the wizard.

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4. That's basically it. By clicking the Next button the wizard will start modifying your disk layout. If you've got to do with the system partition resize, like we do in our case, you will be asked to restart your computer in a special boot-up mode to accomplish the operation. So click the appropriate button to agree.

5. In the Progress window you can see in real-time a detailed report on all actions carried out at the moment.

After completing the operation your computer will be automatically restarted back to Windows where you can see the newly created NTFS partition. Now you've got a place to keep your stuff apart from Windows.

Increasing size of a system partition by taking unused space of an adjacent partition

Let's assume you've got several partitions on your hard disk. After installing a number of resource-consuming applications and system updates your system partition has started to suffer from the lack of free space. But an adjacent partition has a plenty of redundant space. That's just enough to make your system partition suffer no more.

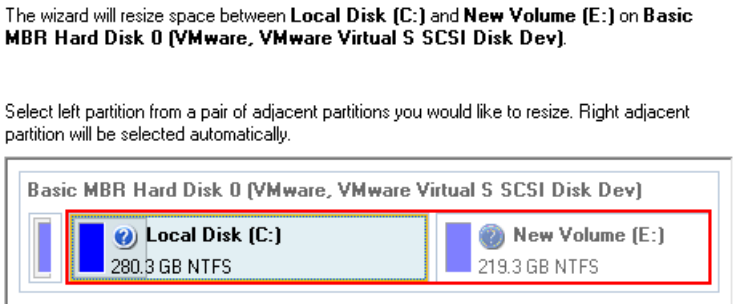
To increase size of a system partition by taking unused space from an adjacent partition, please do the following:

1. Click the **Partitioning** tab on the Ribbon Panel, then select **Express Resize**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the Next button.

3. Click on your system partition. By doing that, the wizard will automatically select an adjacent partition as well. This partition will later act as a space donor.



If you've got more than two partitions on your hard disk and a partition you need to increase is surrounded by other partitions, you've got the choice to choose which partition will act as a space donor. Just click on the left partition of the pair, as the right one will be selected automatically.

4. Increase size of the system partition with the slider or manually by entering the required value. Please note, when you change size of one partition the size of the other will be changed as well, thus redistributing the unused space between the partitions.

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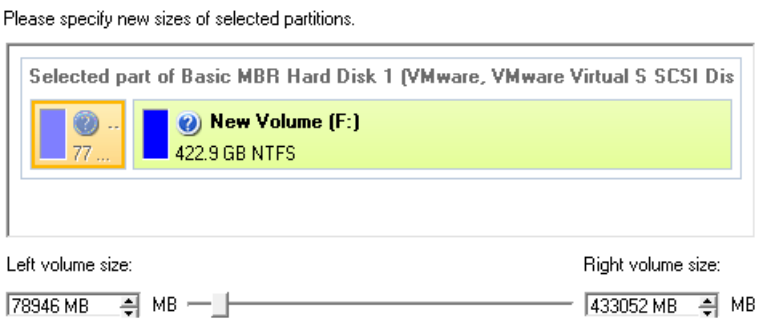


5. On the next page of the wizard you need to confirm the operation by selecting the appropriate option.

6. That's basically it. By clicking the Next button the wizard will start modifying your disk layout. If you've got to do with the system partition resize, like we do in our case, you will be asked to restart your computer in a special boot-up mode to accomplish the operation. So click the appropriate button to agree.

7. In the Progress window you can see in real-time a detailed report on all actions carried out at the moment.

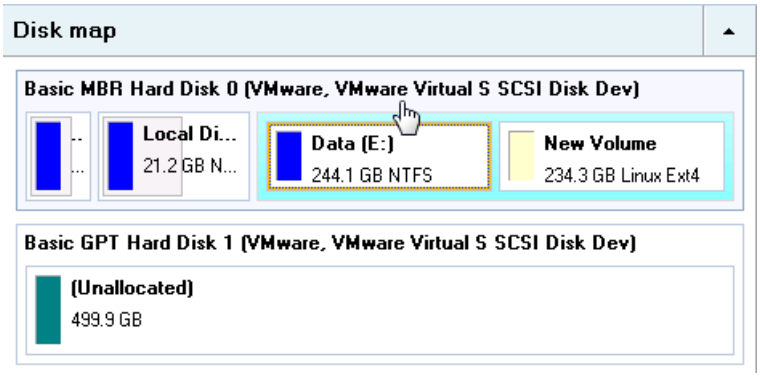
After completing the operation your computer will be automatically restarted back to Windows where you can see that your system partition is bigger now.

Increasing size of a system partition by taking unused space from any other

Let's assume you've got several partitions on your hard disk. After installing a number of resource-consuming applications and system updates your system partition has started to suffer from the lack of free space. But one of your partitions has a plenty of redundant space. That's just enough to make your system partition suffer no more.

To increase size of a system partition by taking unused space from any other on-disk partition, please do the following:

1. In the main window select the required hard disk (if several) on the Disk Map.



2. Choose a space donor partition and then call a context menu for it (right click of the mouse button) to launch the Move/Resize dialog.

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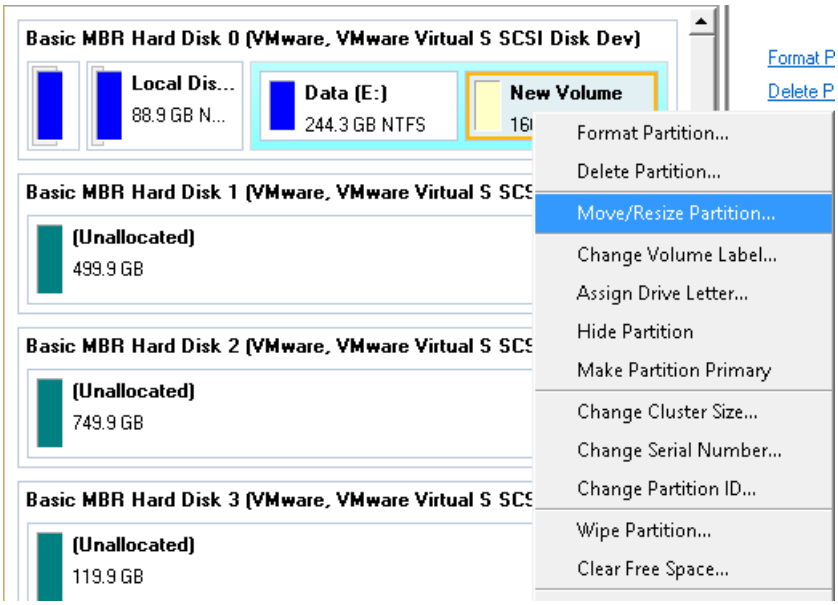
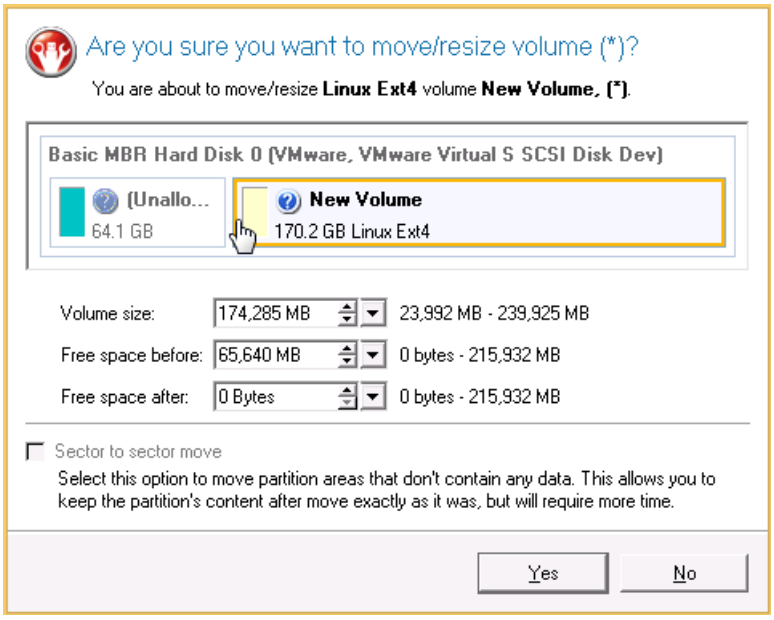
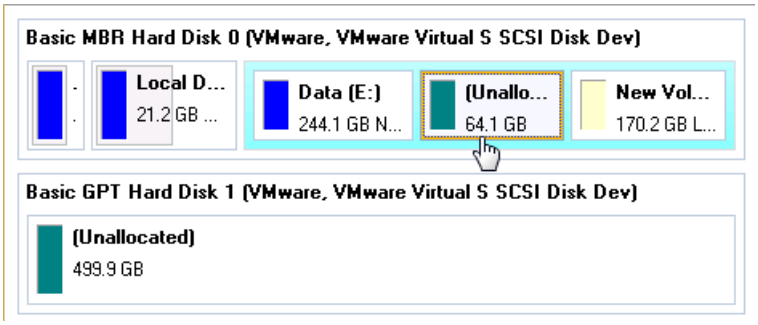


3. In the opened dialog shift the edge of the partition to the right by the drag-and-drop technique. While doing this, free space from the partition will be released (displayed in aqua-green). You can also do it manually by entering the exact size of free space. Click the Yes button to continue.



4. Now you've got a block of free space to add to the system partition. You cannot do it directly however, but by carrying out a number of extra move/resize operations.



5. Since the block of free space is within the extended partition, you need to take it out first. The program enables to resize the extended partition only when there's a block of free space adjoining its borders. In our case it's

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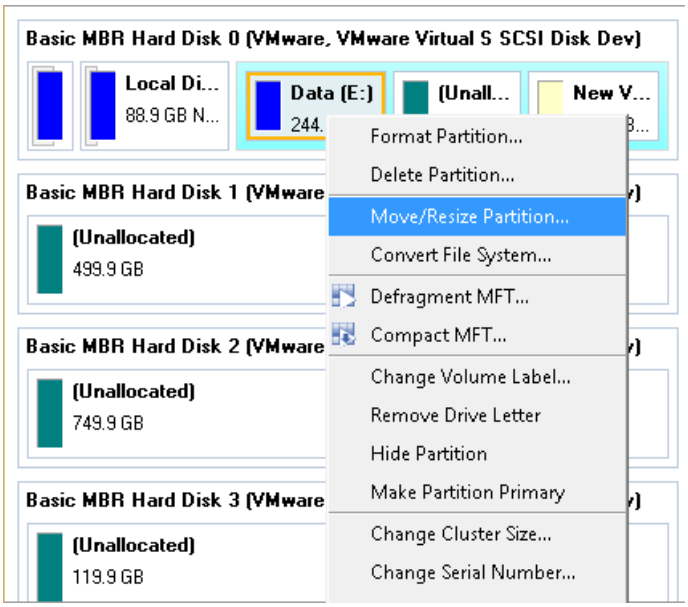
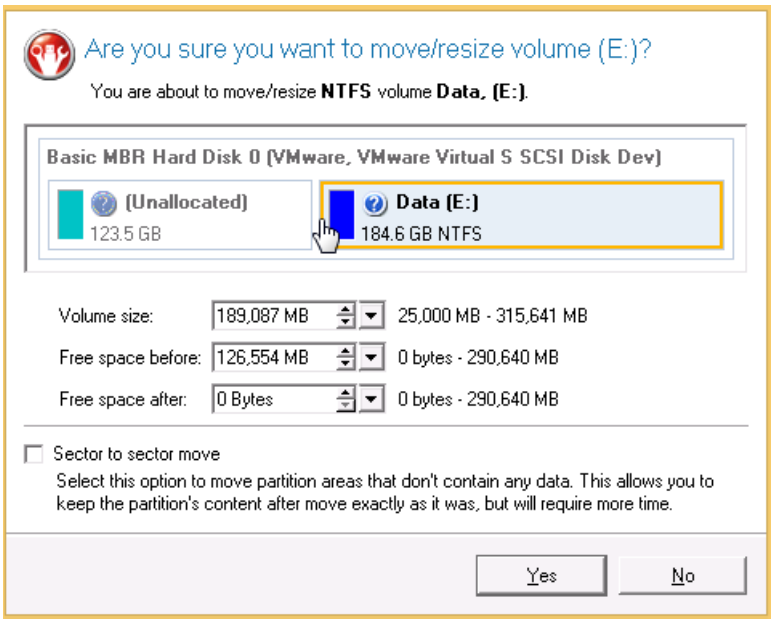
between two logical disks. So we need to move it. To do that, please select the first logical partition and then call a context menu for it (right click of the mouse button) to launch the Move/Resize dialog.



6. At first shift the right edge of the partition to the right, then do the same with the left edge. Make sure the partition size has been left unchanged.



7. Now you can resize the extended partition to take the block of free space out of it. Call the context menu for it (right click of the mouse button) to launch the Move/Resize dialog.

Call a context menu for the extended partition (with the blue border), not the logical one.

8. In the opened dialog shift the edge of the extended partition to the right.

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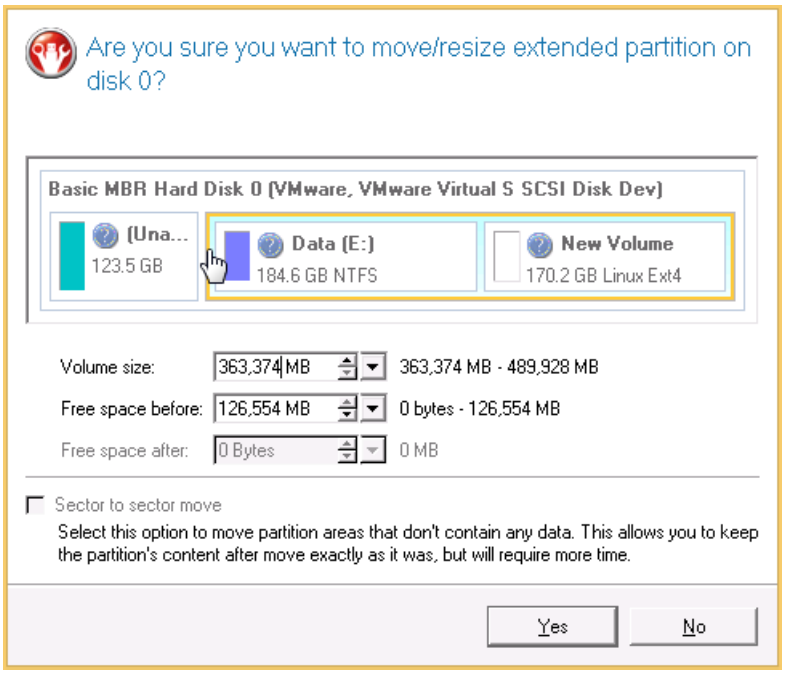
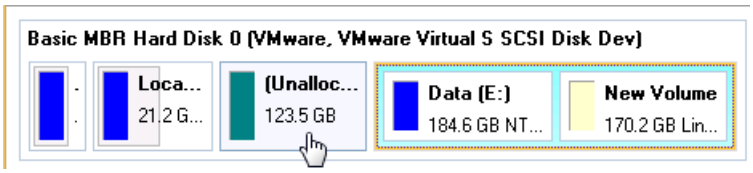
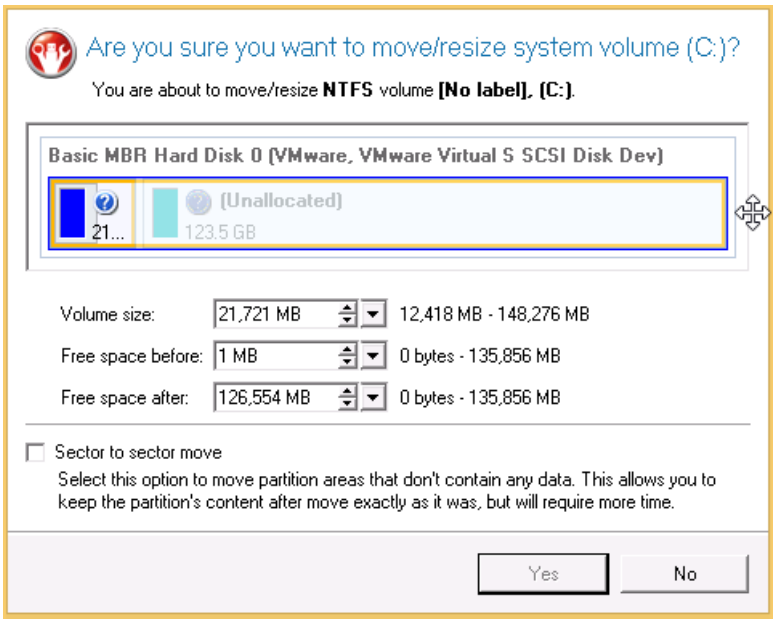


9. The block of free space has been released.



10. Finally increase size of the system partition. Call a context menu for it (right click of the mouse button) to launch the Move/Resize dialog.

11. In the opened dialog shift the edge of the partition to the right, thus increasing its size.



12. Apply all introduced changes. By default, our program works in the virtual mode of execution, so you have to confirm all operations to let the program accomplish them. To do that, just click the Apply button on the Virtual Operations Bar.

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13. The program will require the system restart to accomplish the operation in a special boot-up mode. Click the appropriate button to agree.

Increasing size of a system partition by taking unused space of an adjacent logical partition

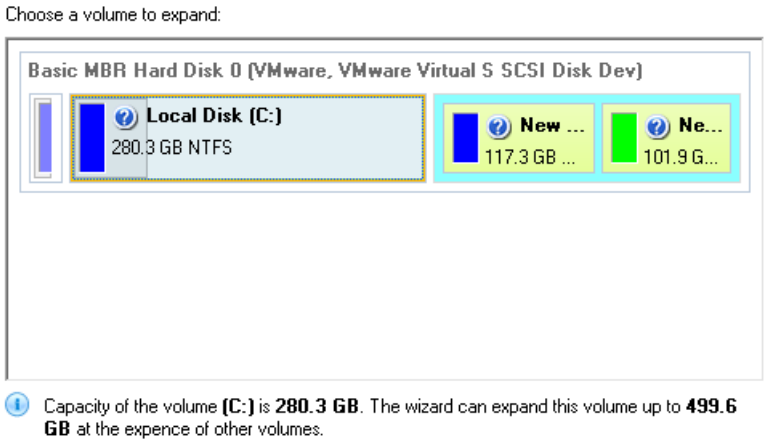
Let's assume you've got several partitions on your hard disk. After installing a number of resource-consuming applications and system updates your system partition has started to suffer from the lack of free space. But an adjacent logical partition has a plenty of redundant space. That's just enough to make your system partition suffer no more.

To increase size of a system partition by taking unused space from an adjacent partition, please do the following:

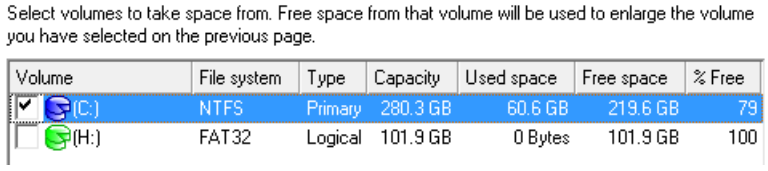
1. Click the **Partitioning** tab on the Ribbon Panel, then select **Redistribute Free Space**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the Next button.
3. Select a volume you want to expand, i.e. the system one.



4. Select a volume to take the space from, i.e. the logical one.



5. On the next page of the wizard you can specify size of the resulted system volume. Drag the slider or type in the exact value to set the volume size.

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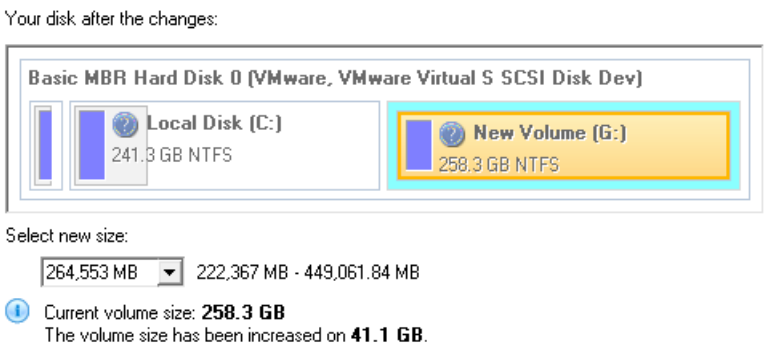


6. Apply all introduced changes. By default, our program works in the virtual mode of execution, so you have to confirm all operations to let the program accomplish them. To do that, just click the Apply button on the Virtual Operations Bar.

Separating OS from media data

Let's assume you've got one partition available on the hard disk, like other people who purchase a computer with a preinstalled operating system. So besides OS, it holds all your documents, favorite music, movies and family photos. This type of configuration is certainly not optimal for effective data organization and safety. First, it negatively affects the system: huge amount of data aggravated by its inevitable excessive fragmentation causes poor performance in file search/access and read/write operations. Second, it's inconvenient for the user: system files and folders piled up with media and documents besides obvious difficulties in transparent organization become a naughty problem in case of a system malfunction.

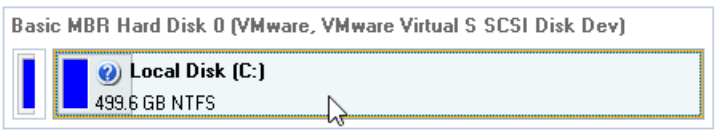
Split Partition Wizard can help you detach the operating system and data or different types of data by splitting one partition to two different partitions of the same type and file system – you just select a partition, then files and folders you'd like to move to the new partition, finally redistribute free space between the two partitions if necessary, and here you are!

Before you start, please take into account the cases when the split operation is impossible to perform:

- Partition's type is not supported (you have selected a non-standard primary or logical partition);
- You've already got 4 primary partitions on a Basic MBR disk;
- You've already got 3 primary partitions on a Hybrid (Retained) GPT+MBR disk;
- There's not enough free space on the selected partition (free up to 50 MB);
- The selected partition has an unsupported file system (currently only NTFS and FAT file systems are available for splitting).

To detach OS from media files, please do the following:

1. Click the **Partitioning** tab on the Ribbon Panel, then select **Split Partition Wizard**.
2. The first page of the wizard informs the user on the upcoming operation. Please read all notes carefully before you proceed. Once you're done with that, click **Next** to continue.
3. Select a volume you want to split up.



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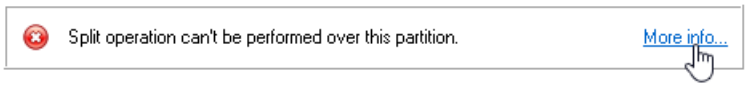
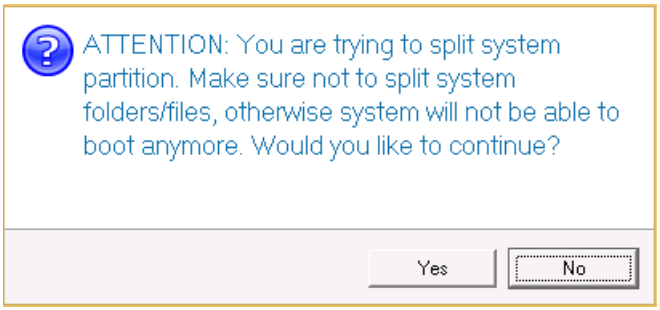
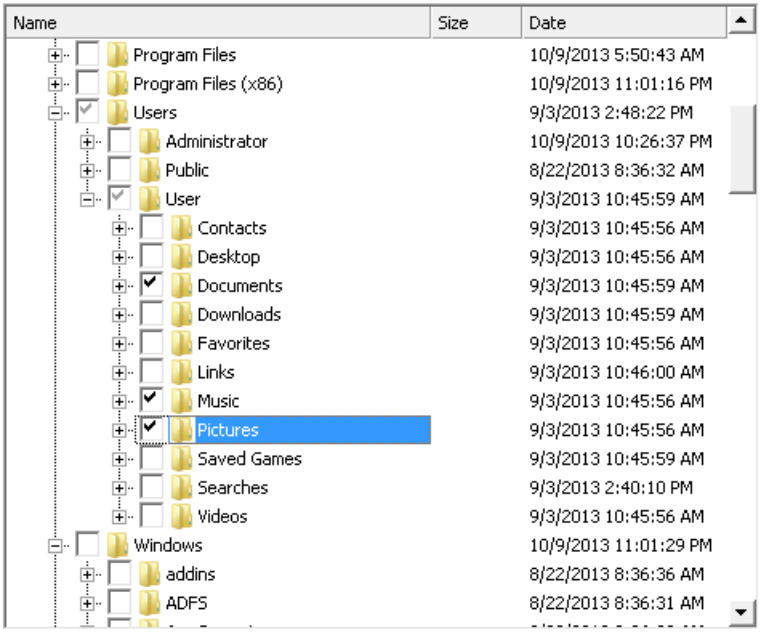
If the wizard cannot work with the selected partition, you'll get a corresponding notification – click on the "More Info…" link to see the details.



4. When selecting a system partition (just our case), the wizard notifies that this type of operation may cause inability of the operating system to start up if moving system files/folders to the new partition. So please take it seriously. If you're sure, confirm the operation.



5. Mark checkboxes next to files/folders you'd like to move to the new partition. Please don't touch system files/folders like "Windows", "Users", "Program Files", config.sys, etc. By clicking the **Next** button, the wizard starts calculating the amount of data to move, which may take some time.



6. Redistribute free space between the partitions by moving the slider or manually by entering the required value for the new partition in the corresponding field. Then choose a drive letter for this partition from the pull-down list that contains vacant letters if necessary (by default, the wizard selects the first vacant one).

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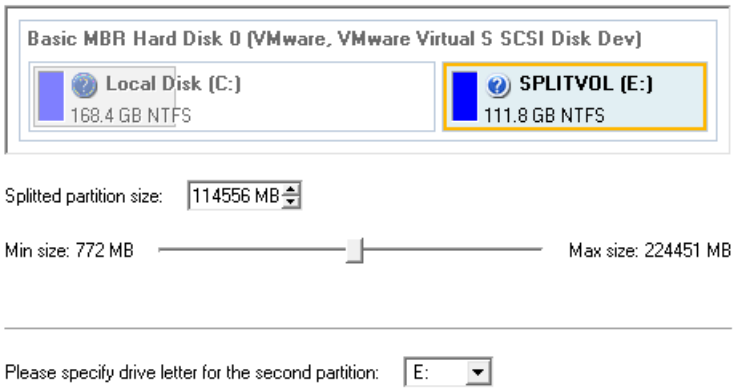

By default, the wizard allocates all free space to the original partition. You should decide for yourself how much of it should be given to the original and the new partitions. Anyway we strongly recommend you to allow free space on both partitions.

7. Review the changes and complete the wizard.
8. Apply all introduced changes. By default, our program works in the virtual mode of execution, so you have to confirm all operations to let the program accomplish them. To do that, just click the Apply button on the Virtual Operations Bar.
9. In the Progress window you can see in real-time a detailed report on all actions carried out at the moment.

Merging a system partition with an adjacent logical partition

Let's assume you've got several partitions on your hard disk. After installing a number of resource-consuming applications and system updates your system partition has started to suffer from the lack of free space. But an adjacent logical partition has a plenty of redundant space. That's just enough to make your system partition suffer no more.

To merge a system partition with an adjacent partition, please do the following:

1. In the main window select the required logical volume on the Disk Map.

2. Call a context menu for it (right click of the mouse button) to launch the Make Partition Primary dialog.

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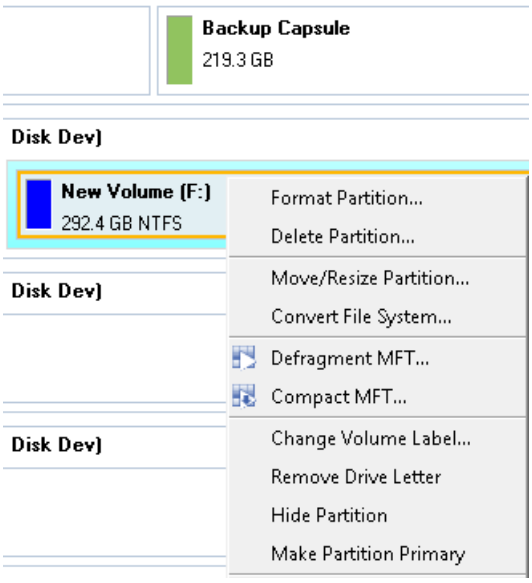
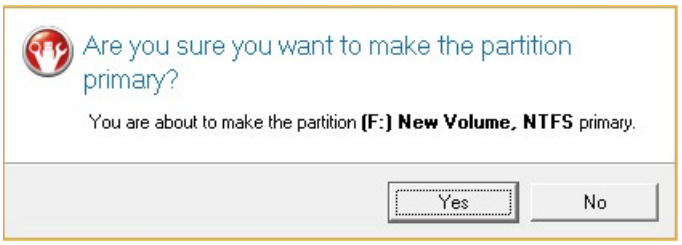


3. Confirm the operation by clicking the Yes button. By default, our program works in the virtual mode of execution, so you can either confirm all operations to let the program accomplish them or continue work in the virtual mode.



4. Click the **Partitioning** tab on the Ribbon Panel, then select **Merge Partitions** (any of the ways described earlier can also be used here).

5. On the Wizard's Welcome page, click the Next button.

6. Click on the left partition of the pair of partitions you need to merge, as the right one will be selected automatically. During the operation all contents of the right partition will be placed in a folder on the resulted joined partition. By default, the program offers an easy-to-understand folder name, which can be customized however.

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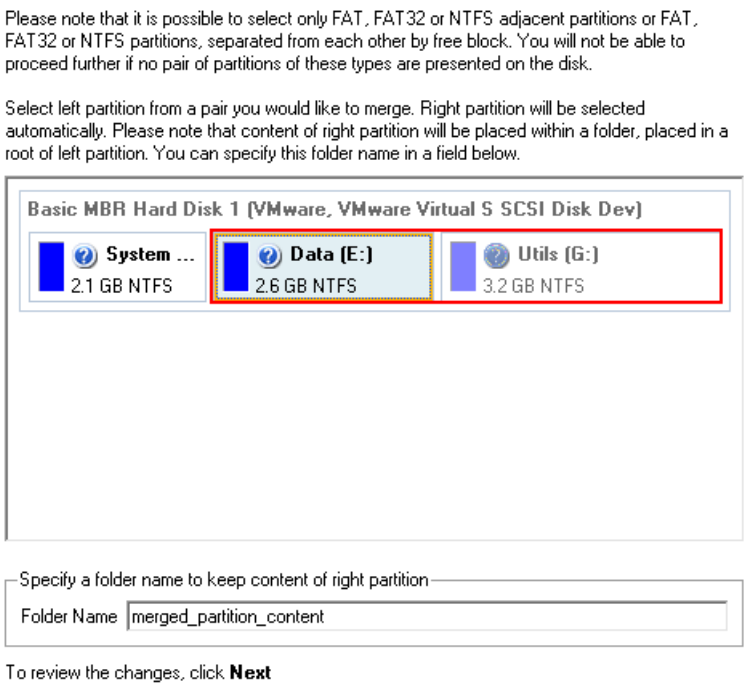

If a system partition is the right one of the selected pair, Windows OS will become unbootable after the merge operation is over.

7. Review the changes and complete the wizard.
8. Apply all introduced changes. By default, our program works in the virtual mode of execution, so you have to confirm all operations to let the program accomplish them. To do that, just click the Apply button on the Virtual Operations Bar.
9. If you've got to do with the system partition resize, like we do in our case, you will be asked to restart your computer in a special boot-up mode to accomplish the operation. So click the appropriate button to agree.
10. In the Progress window you can see in real-time a detailed report on all actions carried out at the moment.

After completing the operation your computer will be automatically restarted back to Windows where you can see that you have the merged volume now.

Shrinking a system partition to increase size of a data partition

Let's assume you've got two partitions on your hard disk, the first one takes about 40% of all the disk space and is exclusively used for Vista 64-bit, while the second servers as a data storage. One day you realize that your system partition doesn't need so much disk space, that's what your data partition really requires at the moment. You can easily tackle this problem with Paragon Linux/DOS recovery environment.

To increase size of a data partition by taking unused space from a system partition, please do the following:

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set

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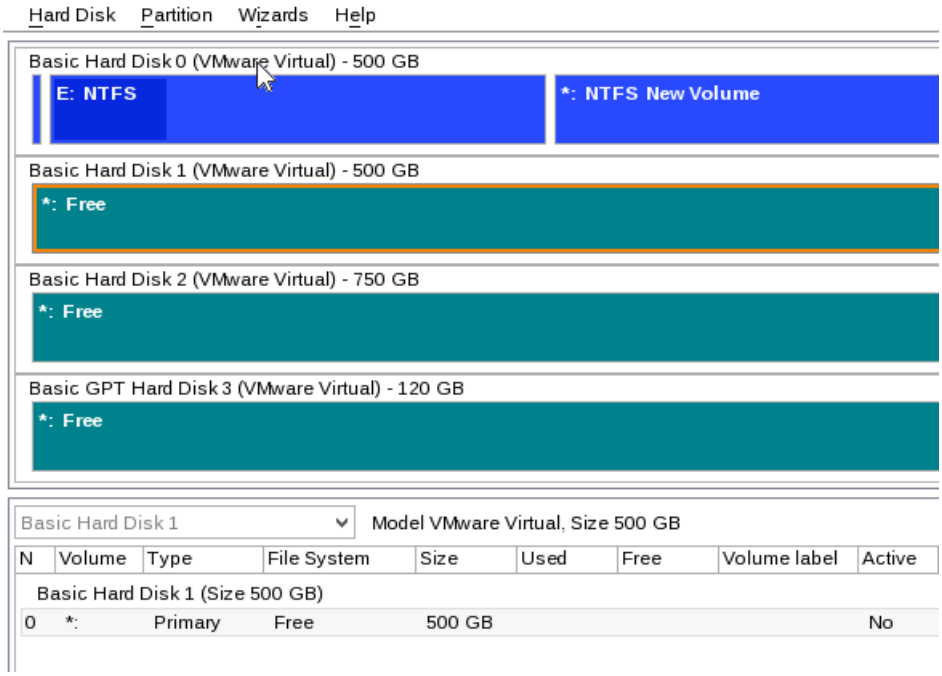
up to boot from CD/USB first.

2. In the boot menu select **Normal Mode** to use the Linux recovery environment (more preferable) or **Safe Mode** to use the PTS DOS recovery environment (in case you've got problems with Linux). Moreover you've got the option to boot into the **Low-Graphics Safe Mode** (PTS DOS safe mode) to cope with a serious hardware incompatibility. In this case, only the minimal set of drivers will be included, like hard disk, monitor, and keyboard drivers. This mode has simple graphics and a simple menu.

By default the Normal Mode will be automatically initiated after a 10 second idle period.

3. In the Linux launch menu select **Hard Disk Manager**. You can find it in PTS DOS as well.

4. In the main window select the required hard disk (if several) on the Disk Map.



5. Choose your system partition and then call the context menu for it (right click of the mouse button) to launch the Move/Resize dialog.

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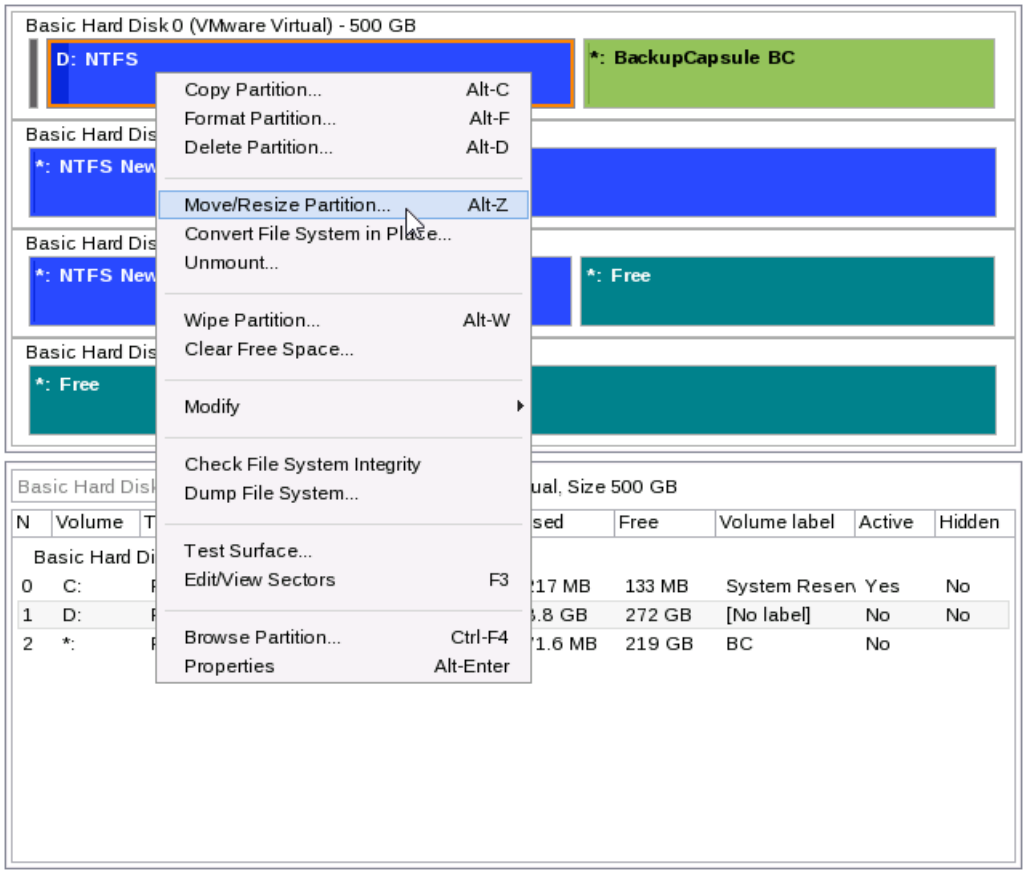
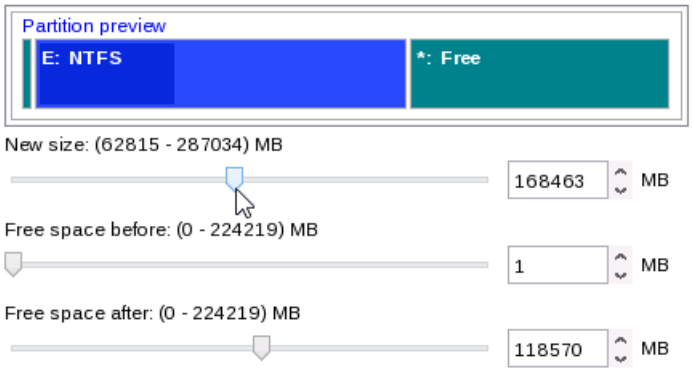


6. In the opened dialog set a new size for the partition by moving the slider or by entering the exact value in the appropriate field. While doing this, free space from the partition will be released (displayed in aqua-green). Click OK to continue.



7. Now you've got a block of free space to add to your data partition.

8. Choose the data partition and then call the context menu for it (right click of the mouse button) to launch the Move/Resize dialog.

9. Move the slider to the right to increase size of the partition. Click OK to continue.

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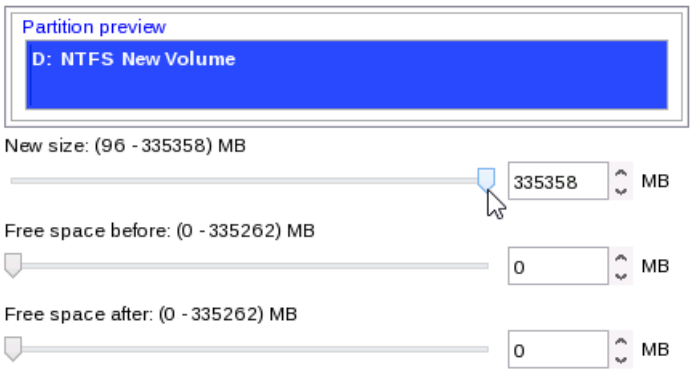
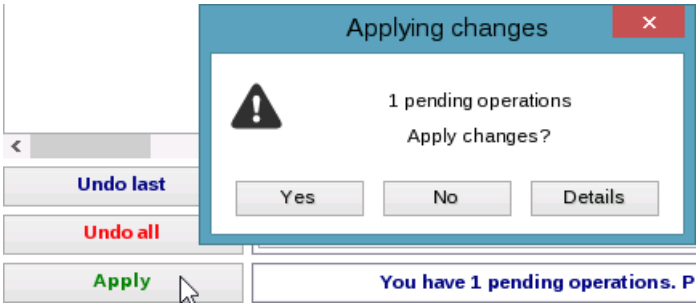
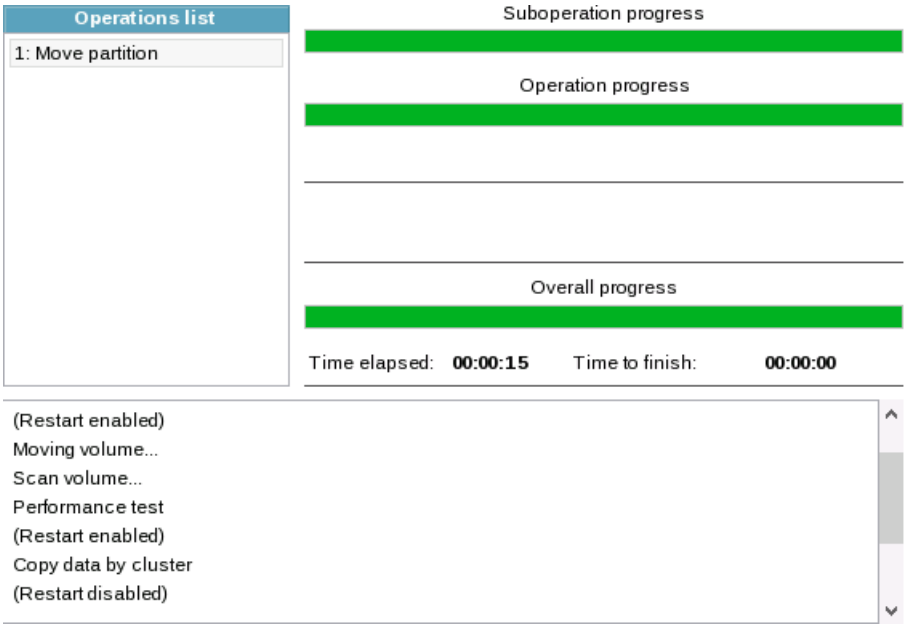


10. Apply the pending changes.



11. In the Progress window you can see in real-time a detailed report on all actions carried out by the program.



Resizing partitions of Apple Boot Camp

Let's assume you're a Boot Camp user who's got Windows XP as the second operating system. Initially allocated space for the Windows partition has turned out to be insufficient for your current needs. The only way out is to take some space from your Mac partition, thus redistributing the unused space between the partitions.

To increase size of the Windows partition by taking unused space from the Mac partition, please do the following:

1. Click the **Partitioning** tab on the Ribbon Panel, then select **Express Resize**.

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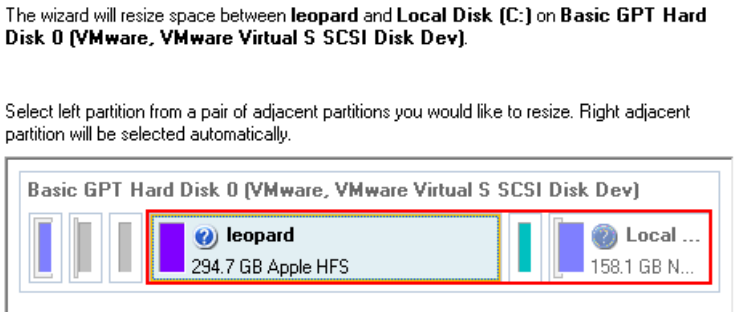
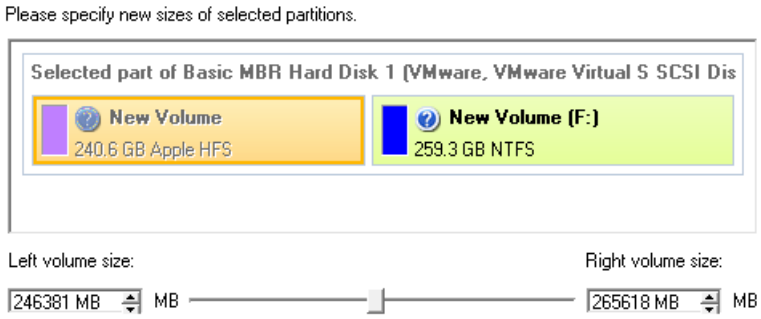
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the Next button.
3. The wizard will automatically select Windows (the NTFS file system) and Mac (the Apple HFS file system) partitions of your Boot Camp configuration.



On the disk map you can also see the GPT service partition (called EFI) as well as a 128-megabyte free block between Mac and Windows partitions made with Boot Camp. It's just for your information.

4. Increase size of your Windows partition with the slider or manually by entering the required value. Please note, when you change size of one partition the size of the other will be changed as well, thus redistributing the unused space between the partitions.



5. On the next page of the wizard you need to confirm the operation by selecting the appropriate option.
6. That's basically it. By clicking the Next button the wizard will start modifying your disk layout. If you've got to do with the system partition resize, like we do in our case, you will be asked to restart your computer in a special boot-up mode to accomplish the operation. So click the appropriate button to agree.
7. In the Progress window you can see in real-time a detailed report on all actions carried out at the moment.

After completing the operation your computer will be automatically restarted back to Windows where you can see that your system partition is bigger now.

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Creating Dual Boot Systems

Windows Vista + Windows XP

Most likely you have only one hard disk with only one partition (the only partition is always system). To install the second operating system you need to repartition your drive first, as it requires a separate primary partition.

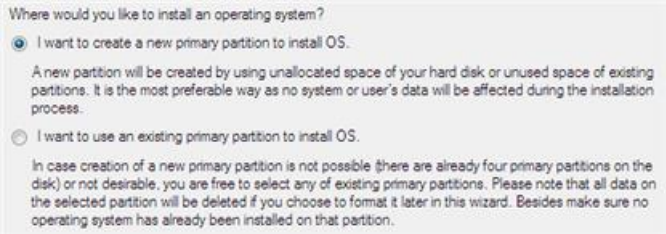
Install New OS Wizard

This scenario implies that operating systems will be installed on different partitions to provide better security and system independence.

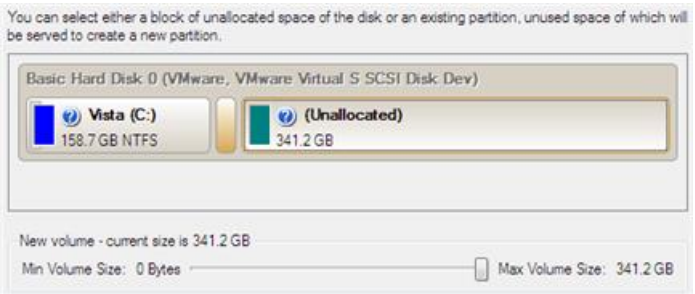
1. Click the **Partitioning** tab on the Ribbon Panel, then select **Install New OS Wizard**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

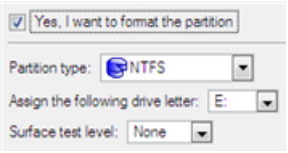
2. On the Wizard's Welcome page, click the Next button.
3. Select the appropriate option to create a new primary partition on your hard disk.



4. On the next page of the wizard, define size of the new partition. If the selected hard disk contains blocks of free space, the wizard will automatically merge them all and allocate the resulted space to create the partition. If not, it will take 50% of the unused space of an adjacent partition, thus resizing it.



5. The next page enables to specify a file system and a number of additional parameters. Since we are going to install Windows XP, the most preferable file systems are NTFS and FAT32. Click the Yes button to continue.



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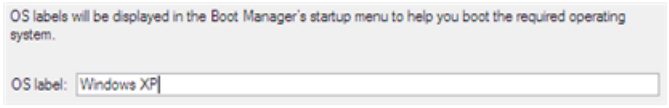
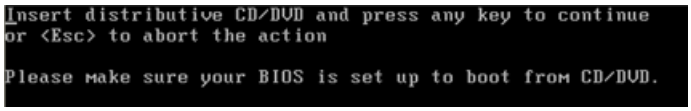
On this page you can specify a number of additional parameters that can also be of help. However here we pay attention to the most relevant to fulfill our task.

6. Enter a label for the future partition in the textual field. It will later be used for the drive identification.



7. The program will carry out all the necessary operations and then automatically restart the computer to initiate the installation process.

If you've changed your mind on installing a new operating system, don't insert its distributive CD but press ESC when the following message appears:



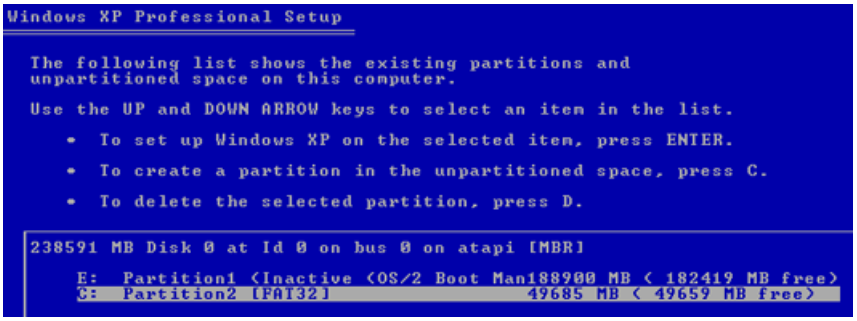
All the mentioned above operations can also be accomplished with the WinPE recovery environment.

8. Install Windows XP on the newly created partition. We won't go into details as for its installation, as you can find all the necessary information in documentation that comes with the product. However to avoid any problems, we consider it necessary to draw your attention on the following issues:

   - You need a bootable distributive CD of Windows XP to install it;

   - To automatically start your computer from this CD, make sure the on-board BIOS is set up to boot from CD first or press F12 during startup to select a bootable device;

   - Do not forget to select the newly created partition as destination.



9. So if everything is OK, you've got to have by this moment Windows XP successfully installed. Your Windows Vista however is still non-bootable. To fix this issue you need to launch the Boot Manager Setup wizard. To do that, please install our program once again, but this time in Windows XP to activate Boot Manager.

To avoid double installation, please use our recovery media to activate Boot Manager.

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10. Click **Boot Management** and then select **Boot Manager** in the Express Launcher.

11. Set up the Boot Manager wizard. The parameters offered by default will do in our case, so just complete the wizard and it will automatically find the two operating systems and update the MBR.

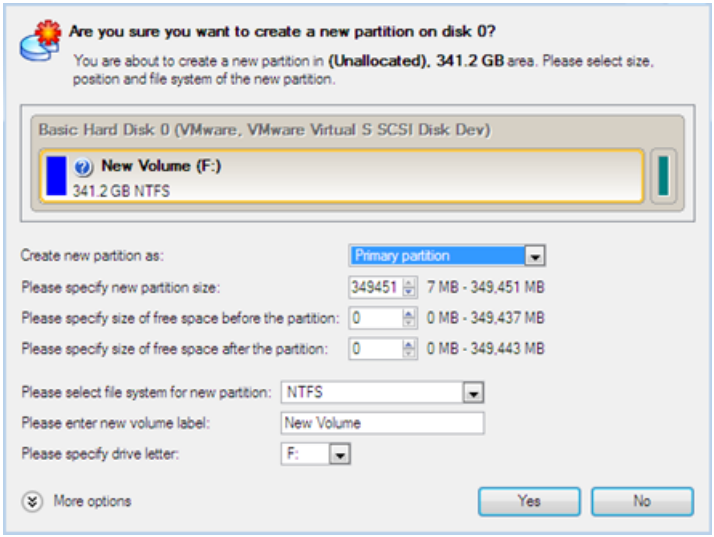
12. Now restart the computer to make sure you have got a dual boot system.

Traditional way

This scenario implies that operating systems will be installed on different partitions to provide better security and system independence.

1. In the main window select your hard disk on the Disk Map to make a block of free space on it.

2. Release some free space (not less than 10 GB to install Windows XP) from the partition. To do that, please call a context menu for the selected partition (right click of the mouse button) and launch the Move/Resize dialog.



3. In the opened dialog shift the edge of the partition to the left by the drag-and-drop technique. While doing this, free space from the partition will be released (displayed in aqua-green). You can also do it manually by entering the exact size of free space. Click the Yes button to continue.

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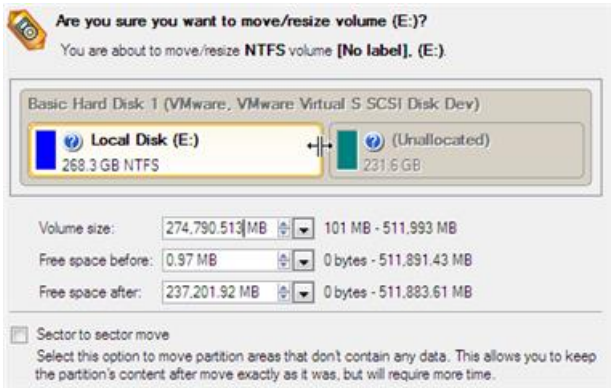
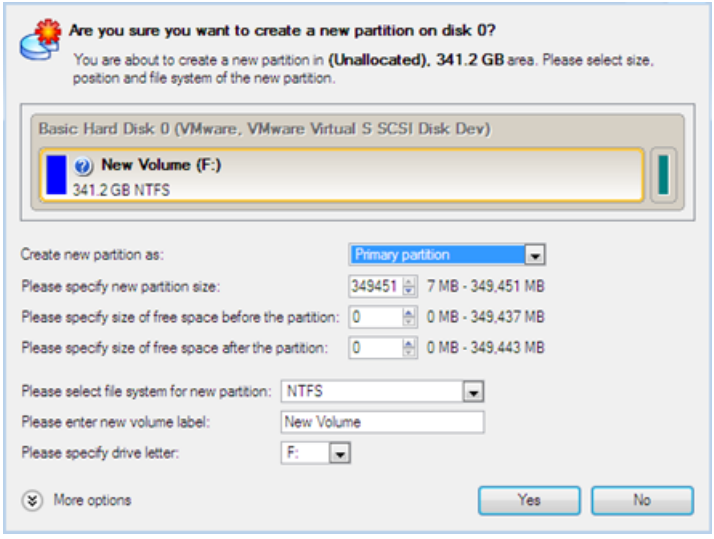


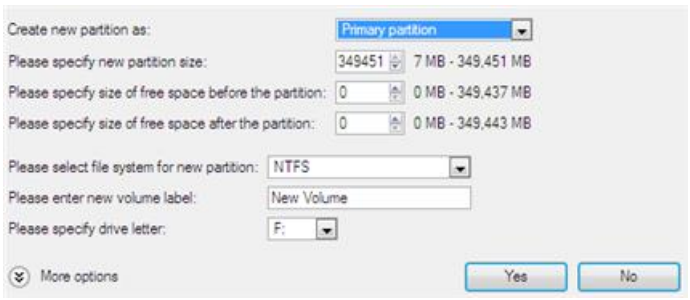
The Move/Resize dialog offers a number of additional parameters that can also be of help. However here we pay attention to the most relevant to fulfill our task.

4. Now you have a block of free space sufficient in size to hold a new partition.

5. Create a new partition to install Windows XP. To do that, please call the context menu for a newly created block of free space (right click of the mouse button) and launch the Create Partition dialog.



6. Define parameters of the future partition. By all means it has to be primary and since we are going to install Windows XP, the most preferable file systems are NTFS and FAT32. Click the Yes button to continue.



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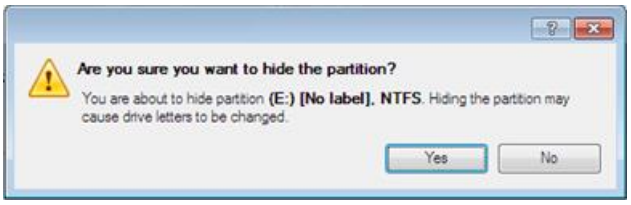
The Create Partition dialog offers a number of additional parameters that can also be of help. However here we pay attention to the most relevant to fulfill our task.

7. As a result of the operation we have got a newly created FAT32 partition just enough in size to comfortably work with Windows XP.

8. Hide the Windows Vista partition to avoid writing any data on it during the Windows XP installation, as it is the best way to provide system independence. To do that, please call the context menu for it (right click of the mouse button) and launch the Hide Partition dialog. Click the Yes button to continue.

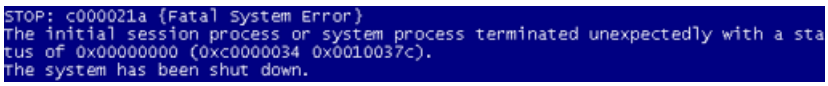


Hiding of the system partition will make OS non-bootable, what is quite normal.

9. Apply all introduced changes. By default, our program works in the virtual mode of execution, so you have to confirm all operations to let the program accomplish them. To do that, just click the Apply button on the Virtual Operations Bar.

10. The program will require the system restart to accomplish the operation in a special boot-up mode. Click the appropriate button to agree.

After all the operations are completed you will not be able to restart the system, what is quite normal. Nevertheless if you do try it, the following error will occur:



All the mentioned above operations can also be accomplished with the WinPE recovery environment.

11. Install Windows XP on the newly created partition. We won't go into details as for its installation, as you can find all the necessary information in documentation that comes with the product. However to avoid any problems, we consider it necessary to draw your attention on the following issues:

    - You need a bootable distributive CD of Windows XP to install it;

    - To automatically start your computer from this CD, make sure the on-board BIOS is set up to boot from CD first or press F12 during startup to select a bootable device;

    - Do not forget to select the newly created partition as destination.

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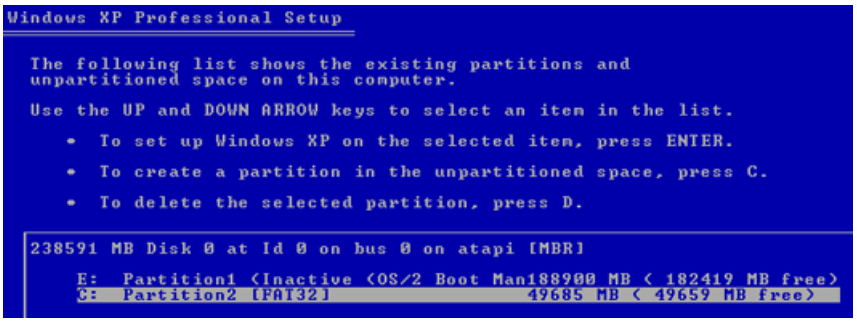


Installation of Windows XP will make Windows Vista non-bootable.

12. Launch the Boot Manager Setup wizard. As your Windows Vista is non-bootable any more, you need to install our program once again, but this time in Windows XP to activate Boot Manager.

To avoid double installation, please use our recovery media to activate Boot Manager.

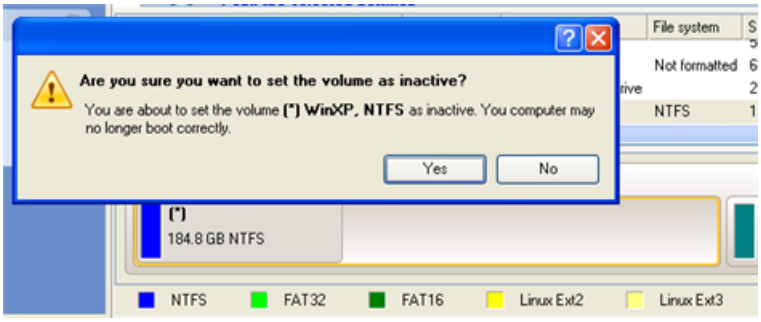
13. Click **Boot Management** and then select **Boot Manager** in the Express Launcher.
14. Set up the Boot Manager wizard. The parameters offered by default will do in our case, so just complete the wizard and it will automatically find the two operating systems and update the MBR.

15. Now restart the computer to make sure you have got a dual boot system.

Windows XP + Windows Vista

As this very situation is very close to the previous one, please use the Windows Vista + Windows XP scenario. However please take into consideration one more step you need to accomplish if you decide to use the traditional scenario:

1. Besides hiding of the system partition before installation of the second OS you need to make it inactive as well. To do that, please call the context menu for it (right click of the mouse button) and launch the corresponding dialog. Click the Yes button to continue;



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Reviving the system partition

In case you are not able or not willing to complete the mentioned above scenarios, but have already reached the point when all changes are applied and everything is ready to install the second OS, please do the following to make your system bootable once again (only relevant for the traditional scenario):

1. Start up the computer from our Linux/DOS recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

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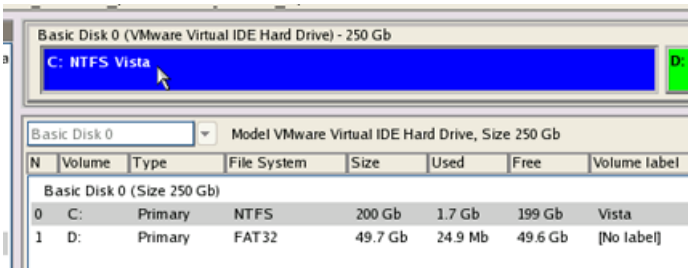
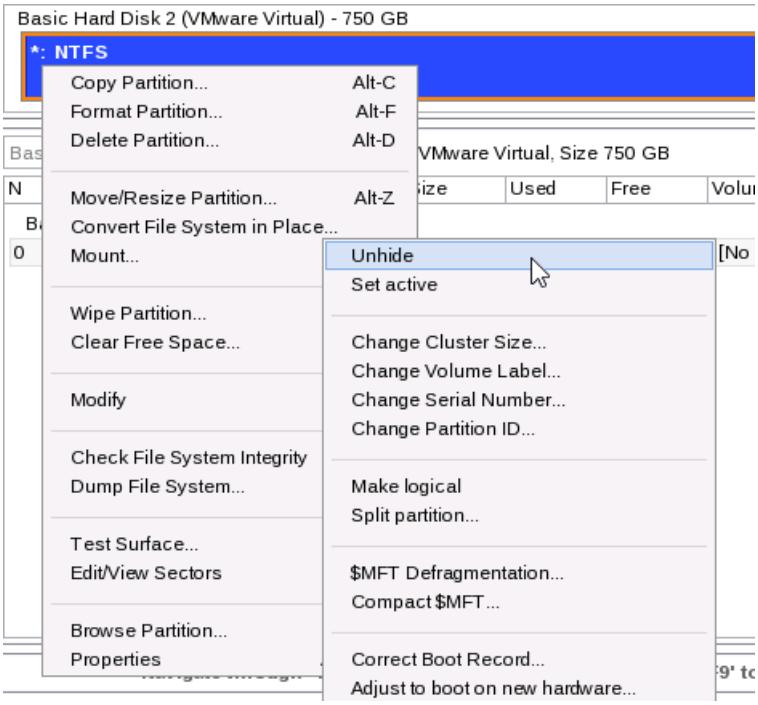
2. In the Linux launch menu select **Hard Disk Manager**.

3. In the main window select your non-bootable Windows partition on the Disk Map.



4. Unhide the partition by calling the context menu for it (right click of the mouse button) and then selecting **Unhide**.



5. Only for the Windows XP + Windows Vista scenario you need to make the system partition active as well by calling the context menu for it (right click of the mouse button) and then selecting **Set Active**.

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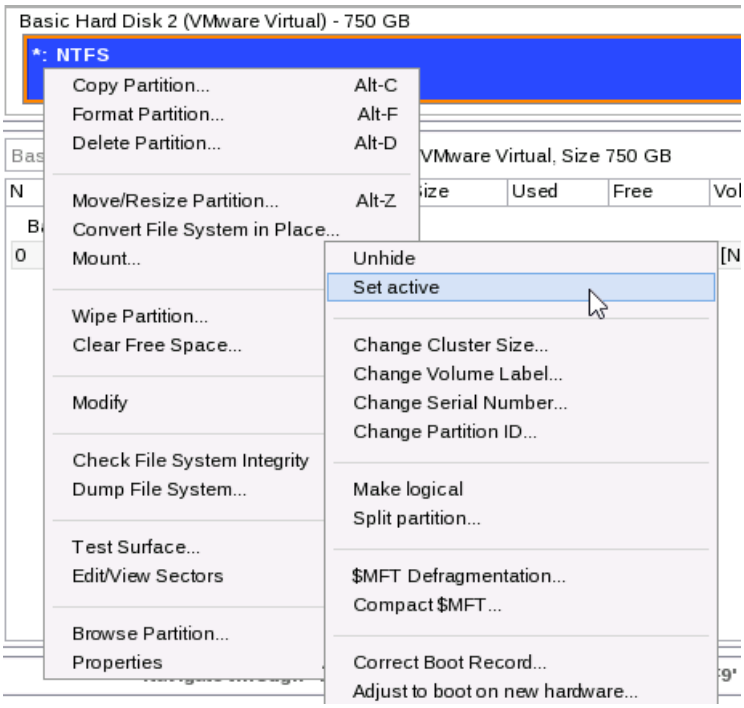

6. You will be notified after the operations are completed.
7. Restart the computer.

System Migration Scenarios

Migrating Windows OS to a solid state drive (Migrate OS to SSD)

The latest SSDs do not boast high capacity, but rather smaller size and faster processing speeds over regular hard drives. Plus, they are completely indifferent to mechanical impact, a feature crucial for mobile computers. These benefits are leading more and more users to consider migrating at least OS to SSDs to get the most out of their systems.

So, how do you migrate a Windows OS and hundreds of gigabytes of data on one huge volume to an SSD drive of 80-128GB? Our Migrate OS to SSD Wizard can help you do that with minimal effort.

To migrate any Windows OS since XP from a regular hard disk to a fast SSD, please do the following:

1. Connect an SSD drive to the computer.
2. Turn on the computer.
3. Click the **Copy & Migration** tab on the Ribbon Panel, then select **Migrate OS**…
4. The first page of the wizard informs the user on the upcoming operation. Please read all notes carefully before you proceed. To get additional information on the subject, click the **Learn more about migrating OS** link at the bottom of the window (highly recommended). Once you're done with that, click **Next** to continue.

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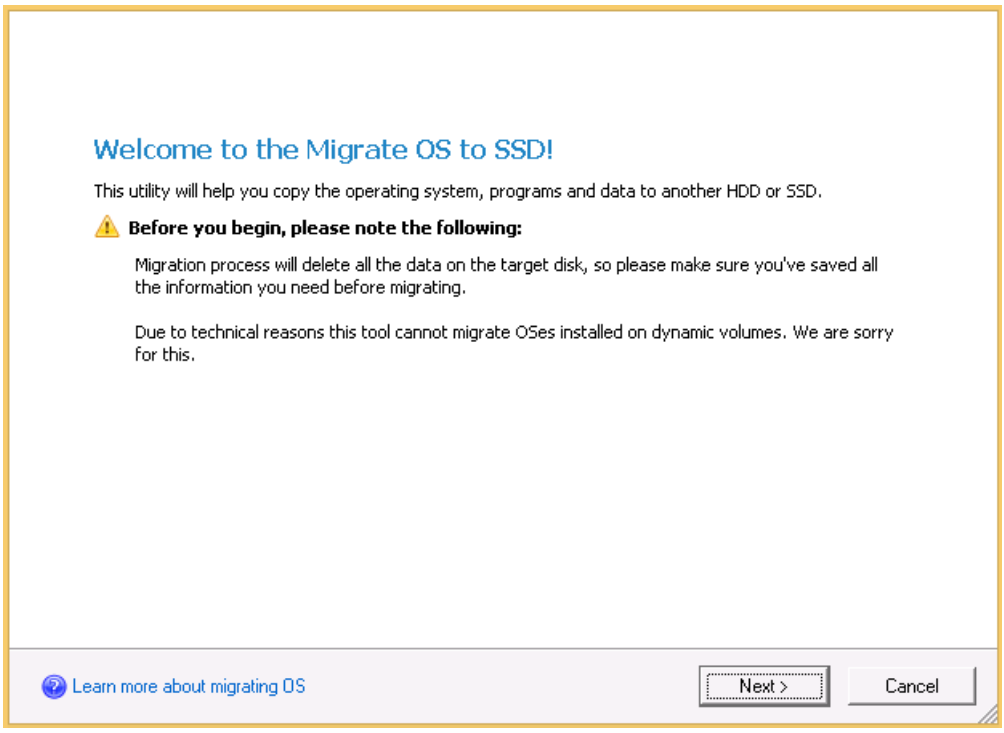
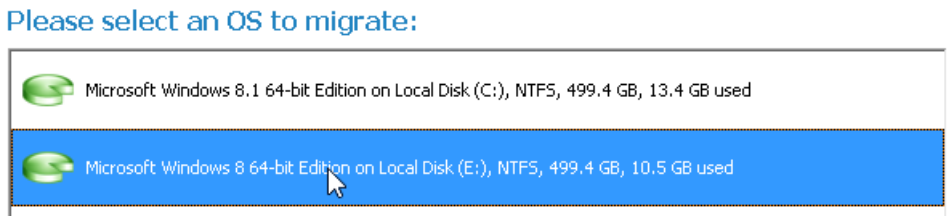
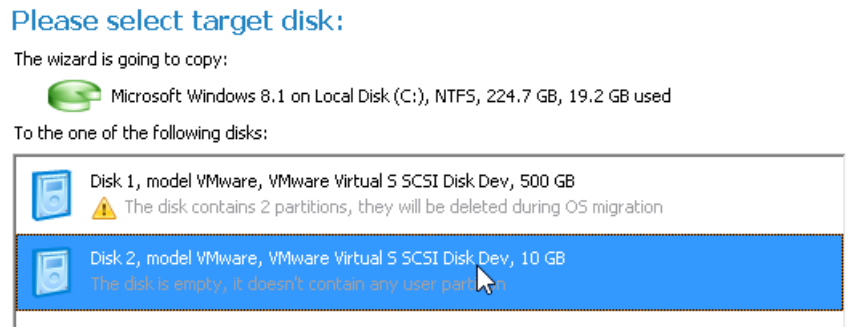


All data stored on the destination disk will be lost during the operation. Please save it to another location beforehand.

5. The wizard will scan your computer for system partitions that accommodate any of the supported Windows OSes. If several are found, it will let you specify which operating system you'd like to migrate.



6. Depending on your choice, it will then automatically pick one or two on-disk partitions (Windows 7 may have Microsoft System Reserved, a special hidden partition that contains boot critical files, while in the uEFI+GPT mode there will be another hidden partition, called EFI System Partition) and prompt you to select a destination disk (if there are more than two drives besides the source).



7. If the selected disk is not enough in capacity to hold your OS (just our case) or you'd like to remove redundant data from the process, click on the corresponding link to additionally exclude files from the system partition.

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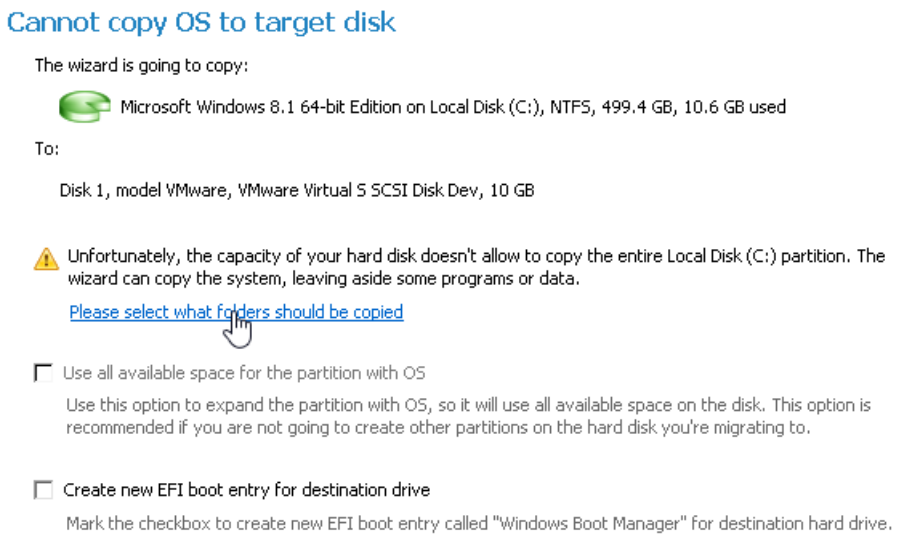
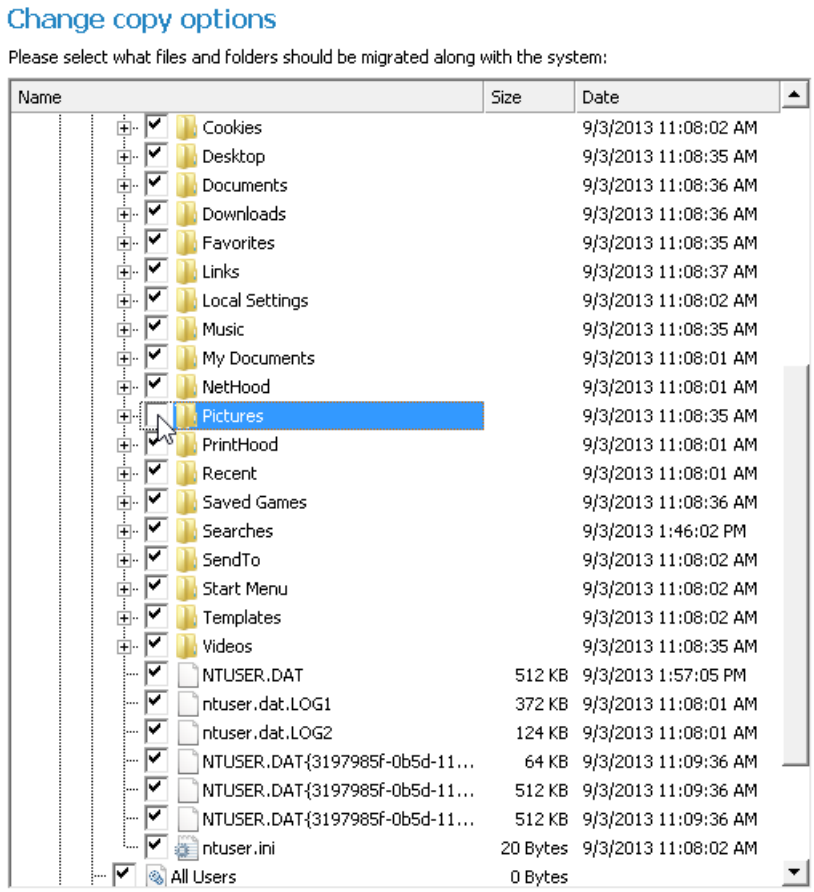
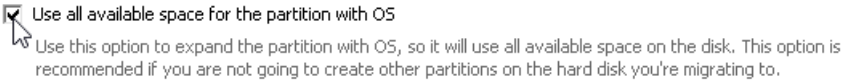


8. Unmark checkboxes opposite unnecessary files or folders to try to fit into the destination disk. We do not recommend you to exclude system files, but those that could take plenty of disk space, like video, music, photos, etc. Once you're ready with the exclusion, click **OK** to let the wizard calculate the resulted size of the partition.



9. If a success, you'll see a note that everything's ready to start the migration.
10. Since we're going to use our SSD drive exclusively for Windows OS, we additionally mark the appropriate option to let the wizard expand the resulted partition across all on-disk space.



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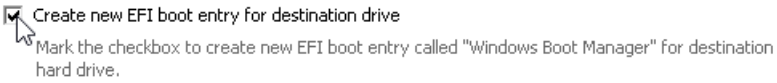
11. The selected source 64-bit Windows 8 is configured to the uEFI boot mode, so if we want to start up Windows from the target SSD, we need to additionally mark the appropriate option. Please note however the source disk will become unbootable after the migration is over. Anyway you can specify a bootable device at any time through Boot Corrector.



The option above will be available to the user only if the target disk becomes Bootable GPT as a result of the migration process.

12. Click **Copy** to initiate the migration process. When the operation is over, first check up Windows OS starts up from the target SSD. If yes, delete the Windows OS partition from the source disk, then re-partition the disk according to your needs.

Migrating system to a new HDD (up to 2.2TB in size)

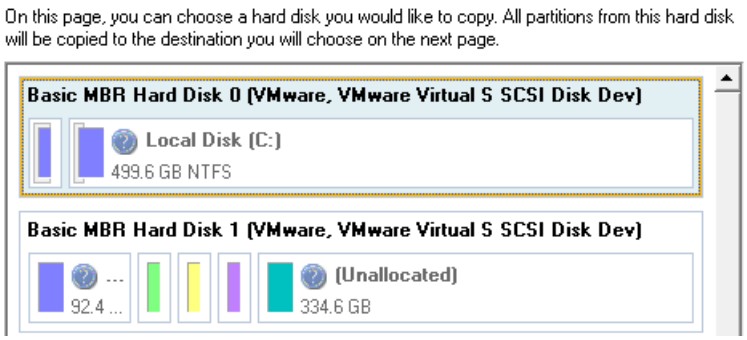
Let's assume that you've bought a new hard disk that is up to 2.2TB in capacity. It's faster and of much higher capacity than your current system disk, so it's quite natural you start thinking about system migration. We can help you do that.

To migrate your system to a hard disk that doesn't exceed the 2.2TB capacity limit, please do the following:

1. Connect both source and destination disks to the computer.
2. Turn on the computer.
3. Click the **Copy & Migration** tab on the Ribbon Panel, then select **Copy Hard Disk**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

4. On the Wizard's Welcome page, click the Next button.
5. On the Select Hard Disk to Copy page, select a source disk (a hard disk you want to copy).



6. On the Select Target Hard Disk page, select a destination disk (a hard disk to copy contents of the source disk).

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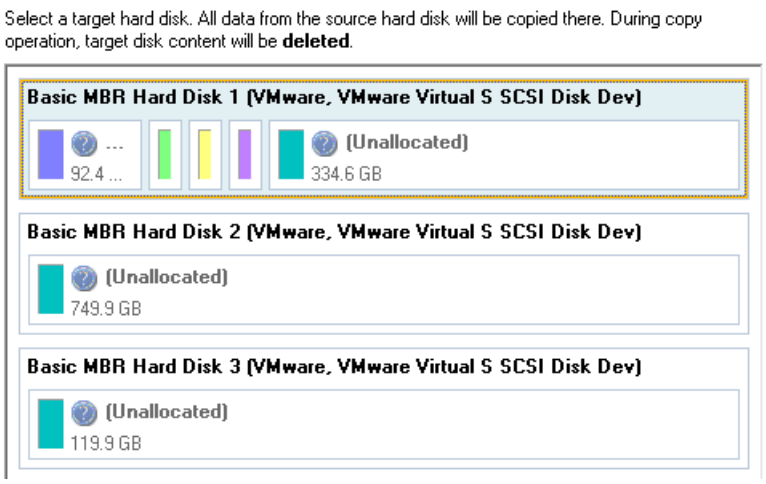
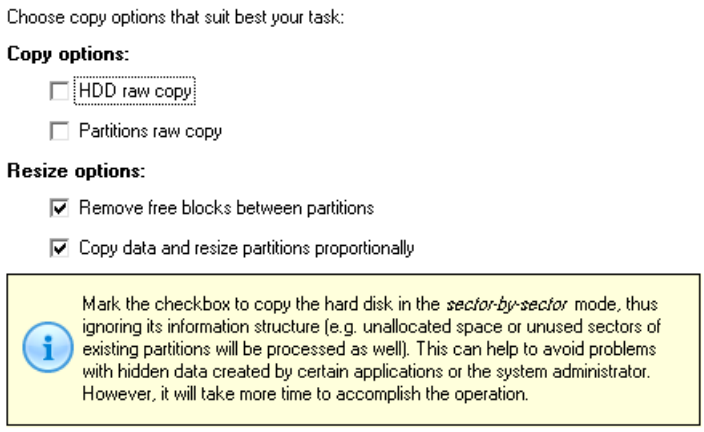


During the operation all contents of the destination disk will be deleted.

7. On the next page of the wizard, define the copy options. In our case we'd rather copy data with a proportional resize to occupy the entire disk. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the **Create new EFI boot entry for destination drive** option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through Boot Corrector.



The 'Create new EFI boot entry for destination drive' option will be available to the user only if the target disk becomes Bootable GPT as a result of the migration process.

8. On the Revise Copy Results page review all parameters of the operation.

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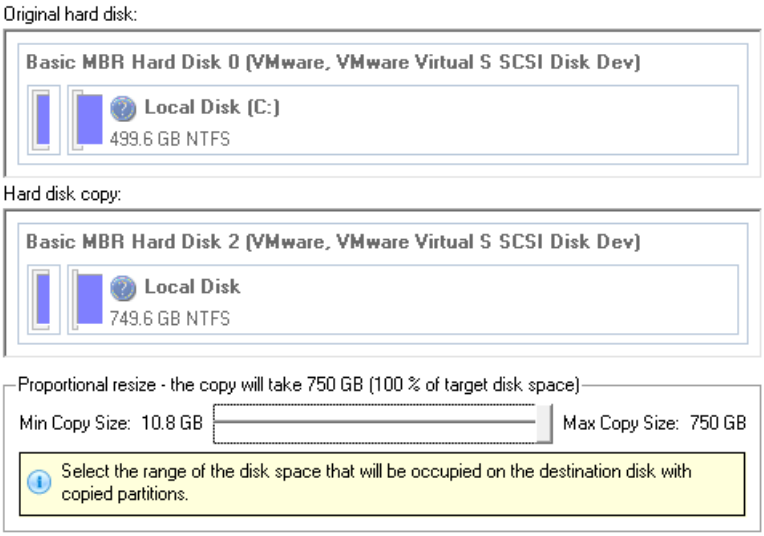

9. Complete the wizard and then apply the pending changes.
10. When copying is completed, shut down the computer.
11. Disconnect (physically) the source hard disk.
12. Boot the computer from the destination hard disk.

To make Windows bootable on different hardware, please additionally complete the P2P Adjust OS Wizard.

Making system bootable on different hardware (P2P Adjust OS)

Let's assume you had to migrate to a new hardware platform. You connected your system hard disk to the brand new PC and tried to start up the operating system - you do know for sure now that this operation had been doomed to failure from the very beginning. With our program you can easily tackle this naughty problem.

Before you start, please make sure the following conditions are met:

- You've got drivers for the new hardware ready to use, not zipped or in .exe files.
- Your OS is unrolled on the new computer, not in a backup image.

To make a Windows physical system bootable on different hardware, please do the following:

1. Start up the computer from the WinPE recovery media.

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

To automatically boot from the recovery media please make sure the on-board BIOS is set up to boot from CD/USB first.

2. Launch the **P2P Adjust OS Wizard**.

The WinPE based environment offers excellent hardware support. However in case it doesn't have a driver for your disk controller, your hard disks will be unavailable. Please

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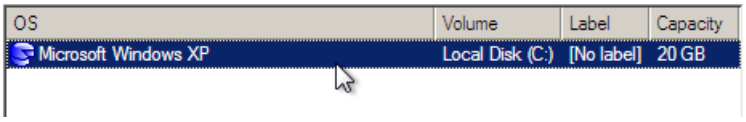
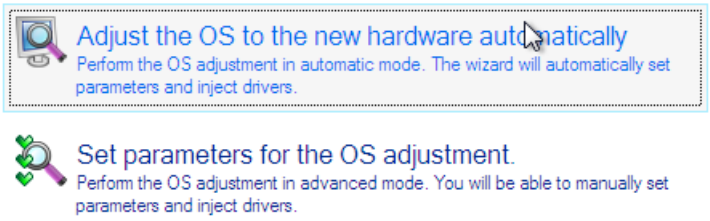
consult the Adding specific drivers scenario to know how to tackle this issue.

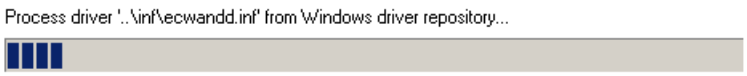
3. On the Wizard's Welcome page, click the Next button.
4. From the list of all found Windows systems (if several) select one you need to adjust to the new hardware. If you're willing to adjust them all, just re-launch this wizard for each.



5. There are two execution modes to choose from: **fully automatic** and **advance**. Below we will go set-by-step through the automatic scenario to show the whole process, and then take a closer look at specifics of the advance scenario.



6. Select **Adjust the OS to the new hardware automatically**.
7. The wizard will automatically accomplish all the necessary actions.



8. The only action that might be required from your side is to set a path to an additional driver repository in case the wizard has failed to find drivers for some boot critical devices in the built-in Windows repository. Generally together with new hardware you get its drivers for different operating systems on removable media (mostly CD or DVD). By collecting all these drivers in one folder you can let the wizard automatically pick and install only those required for your OS. Select **Search for drivers in a specific folder**.

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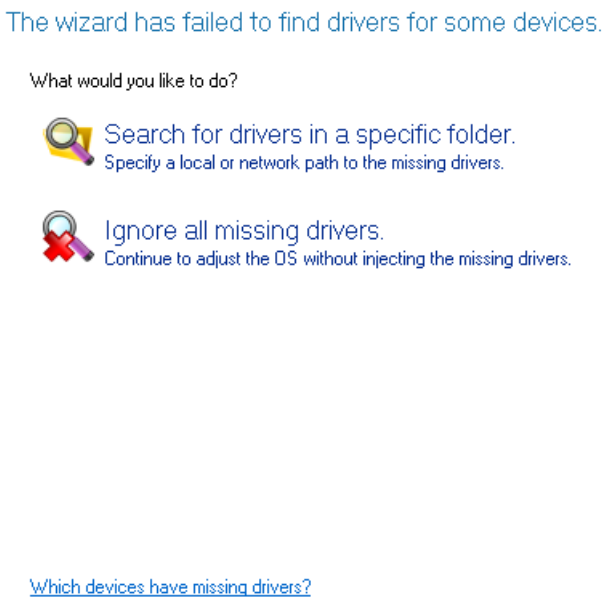
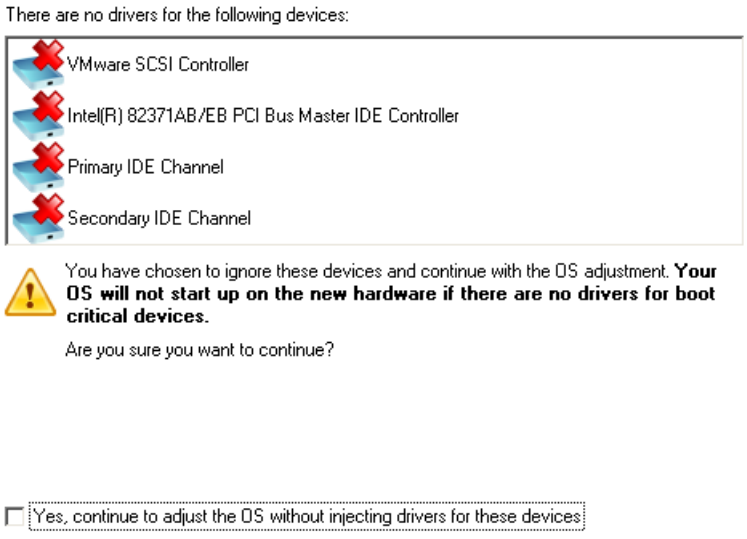
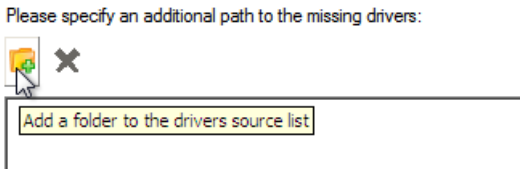


Click on the link at the bottom of the page to see what boot critical devices have no drivers. The wizard names all devices according to their model description, not some alphanumeric code, which is very convenient.

9. Though you've got the option to continue without injecting missing drivers for boot critical devices (The **Ignore all missing drivers** option), we strongly recommend you not to do it. Otherwise we cannot guarantee your Windows will start up on the new hardware.



10. The wizard can search for drivers on a local disk or a mapped network share. In our case it's on a network share, this is why we need to map it first.



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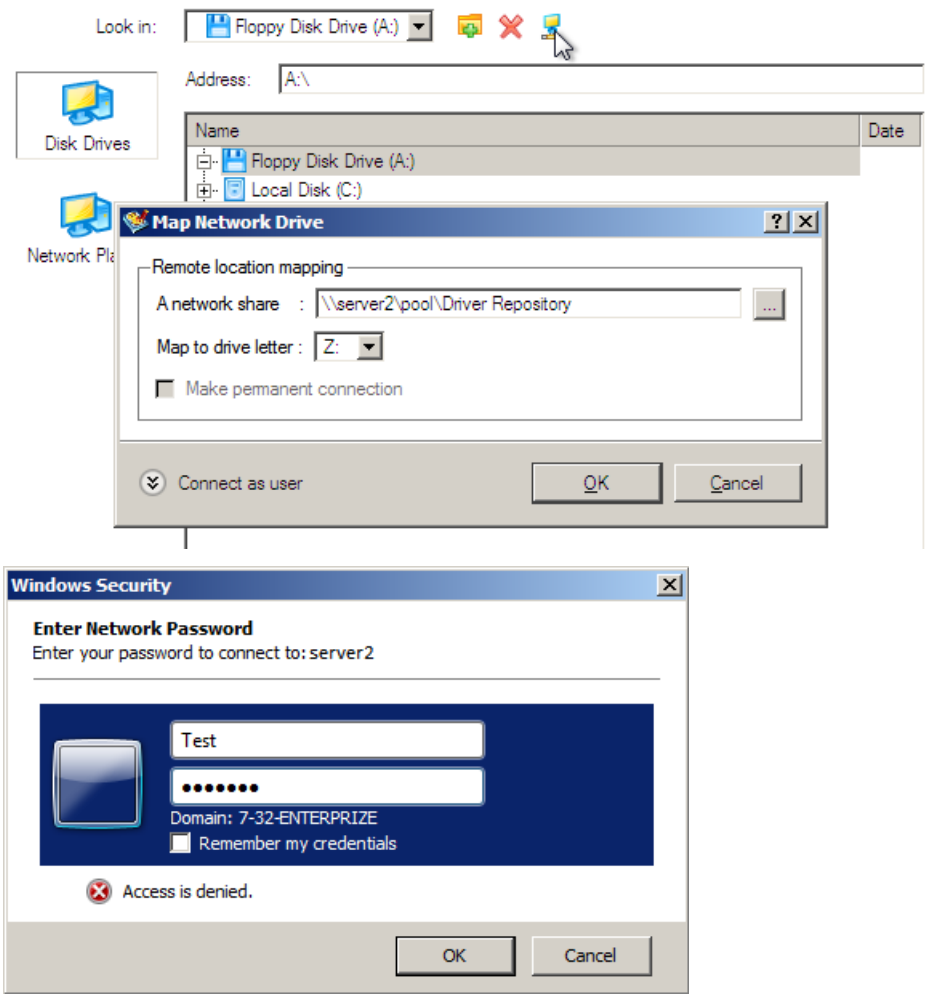
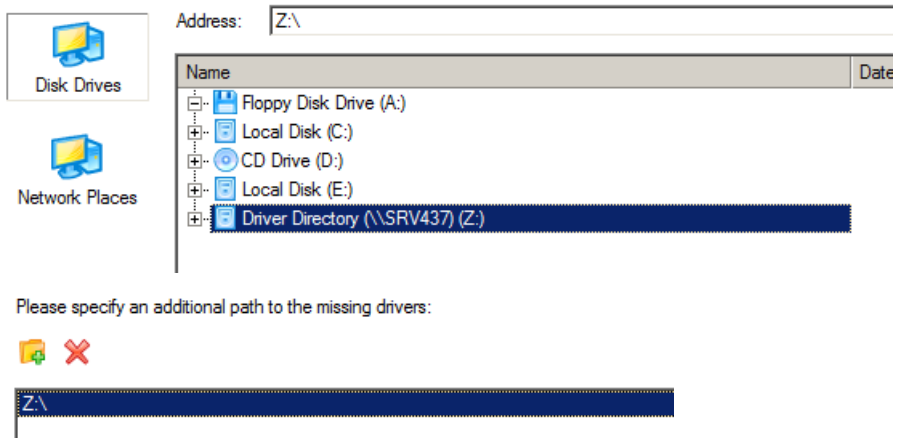


11. When done, we can select it as target.



The wizard enables to specify several driver repositories.

12. If the wizard has found all missing drivers, it will ask you to confirm the operation. Apply the changes to complete.

After the operation is completed the system will be bootable on the new hardware. After the startup, Windows will initiate reconfiguration of all Plug'n'Play devices. It’s a standard procedure, so please don’t worry and prepare the latest drivers at this step to get the most out of the system.

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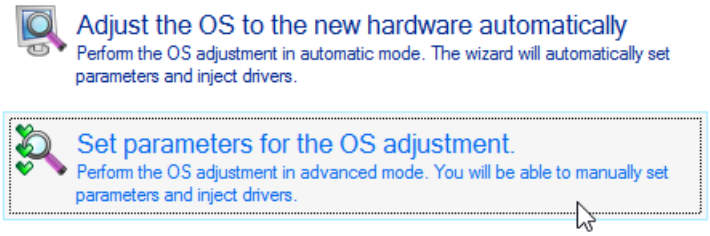
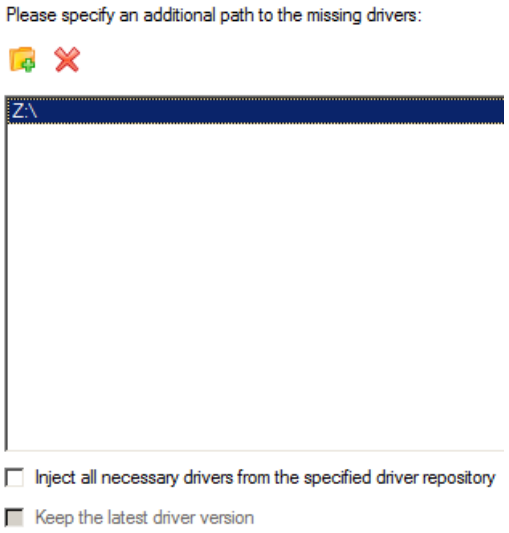
Advance scenario specifics

1. To launch the advance mode, select **Set parameters for the OS adjustment**.



2. When setting additional driver repositories, you can specify how to process drivers for found hardware.



   - **Inject all necessary drivers…** Mark the checkbox to force injection of all drivers for your devices from the given driver repository(s), even if there are already installed drivers for some hardware. Please use this option if you suspect any of the installed drivers of not matching your hardware.
   - **Keep the latest driver version**. Mark the checkbox to keep the latest version of drivers during the forced re-injection. You can use this option only when the above option is active.

3. Just before the OS adjustment, you can additionally:

   - View all found hardware devices and their driver status by clicking . The wizard names all devices according to their model description, not some alphanumeric code, which is very convenient. So you can compare the listed devices with the given hardware to make sure the wizard has analyzed your system correctly.

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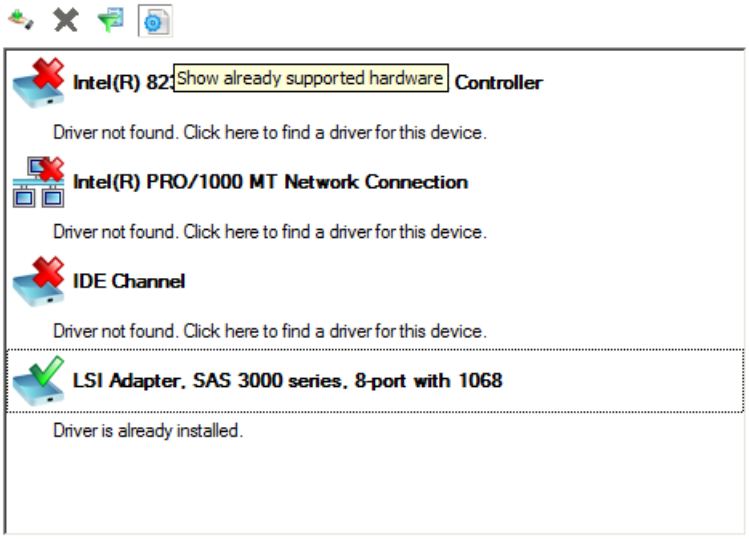
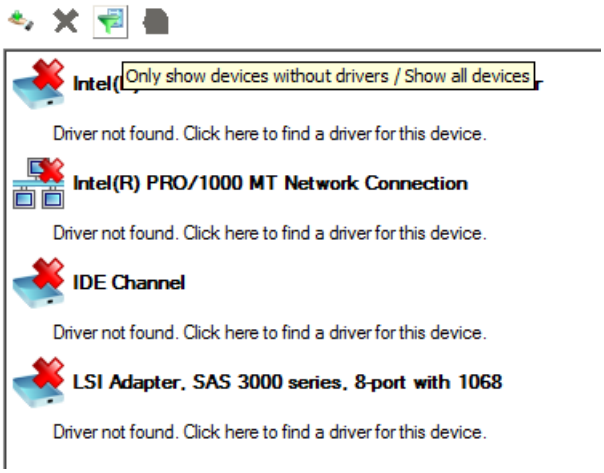
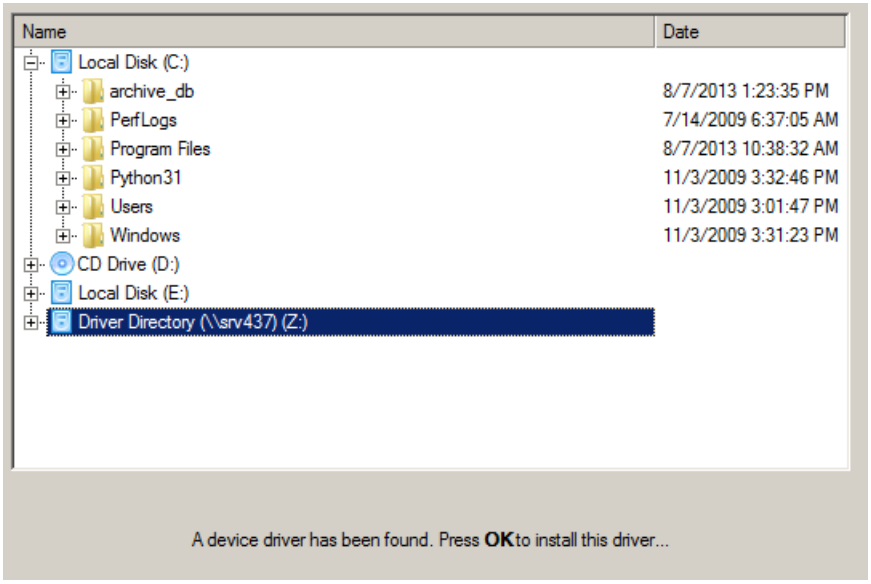


- Filter devices without drivers by clicking . Unlike the automatic mode, where only boot critical devices (storage controllers) without drivers are being reported, here you can view and inject drivers for network cards as well.



- Add a driver for each device that lacks it by clicking on the device, then browsing for the required location. The wizard will then match the device with drivers inside the given location and pick the right one.



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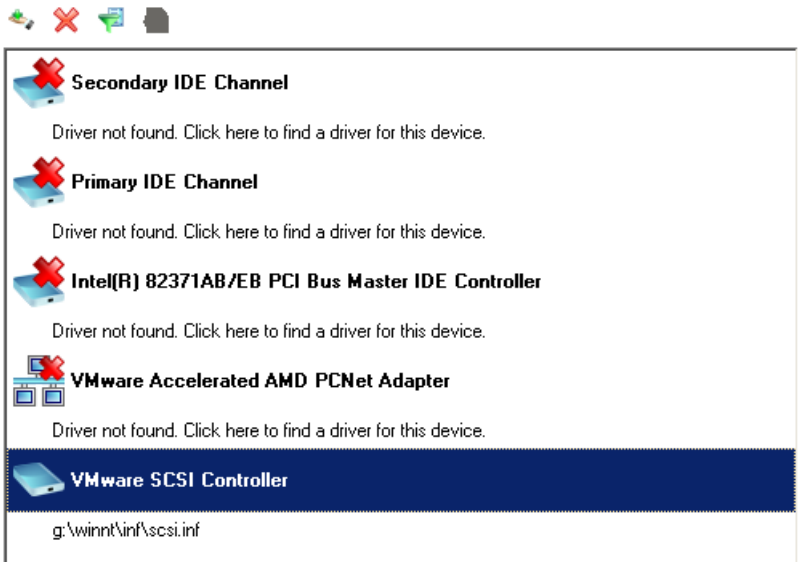
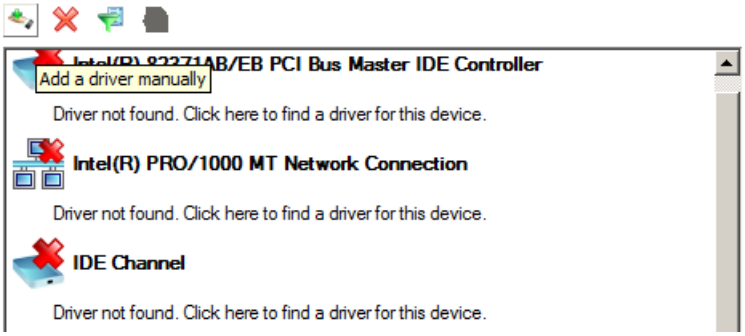
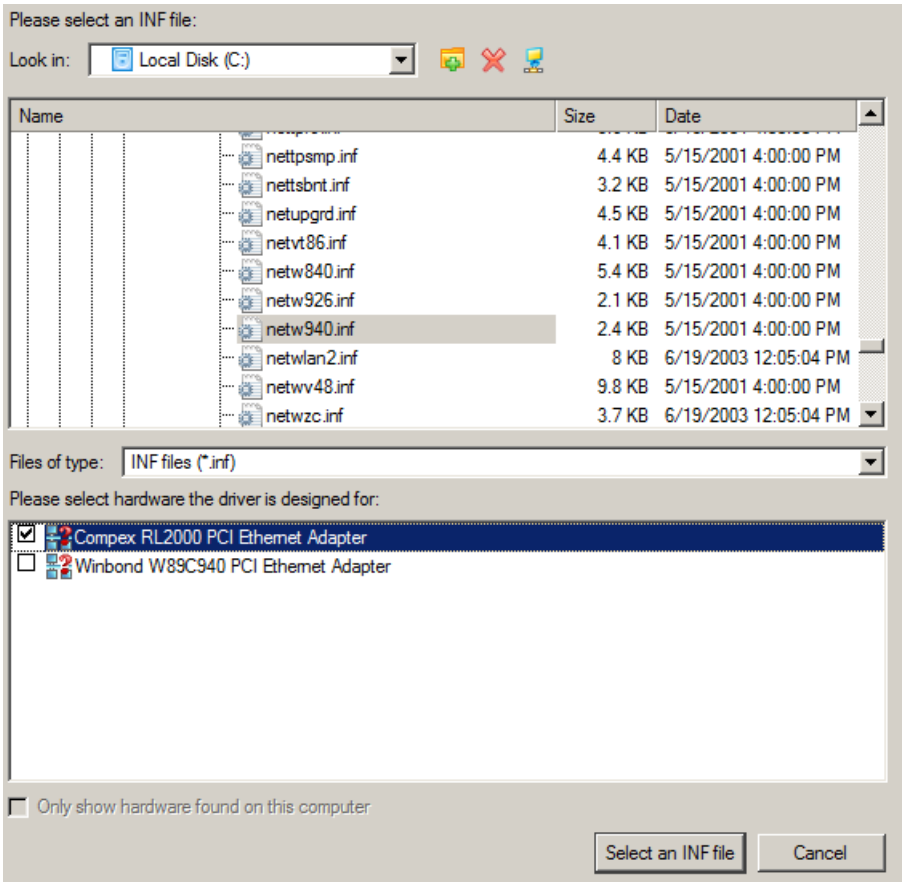


- Manually add a driver for a device that has not been found by our wizard by clicking , then specifying the required .INF file.





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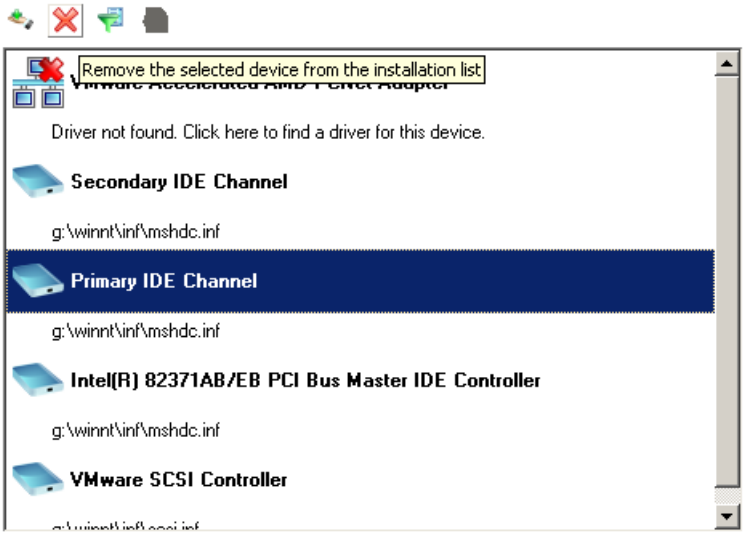
When selecting an .INF file that contains several driver records for hardware you both, have in the system and don't have, you can filter the list by marking the appropriate checkbox.

- Remove a driver for a device, which has not been found in the system.



Virtualizing the current system (P2V Copy)

Let's assume that you're about to migrate to a brand-new hardware platform with the latest operating system available for it. Your current system is quite obsolete, but you still need access to some of its software. You don't want to waste time re-installing the old software to the new system, and you do know for sure that the bulk of it won't work anyway. The best way out is to virtualize your old system.

But before you start, please make sure the following conditions are met:

- Your hard disk has enough free space to store a virtual image of your Windows (depends on the system).
- You've got one of the supported virtualization software.

To make a virtual disk out of your current system, please do the following:

1. Click the **Copy & Migration** tab on the Ribbon Panel, then select **P2V Copy**.

There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the Next button.
3. Select objects you need to virtualize. You're allowed to select any combination of hard disks and partitions, but don't forget to choose your system partition (**Local Disk C:** in our case) to use it as guest. Otherwise the resulted virtual machine won't start up.

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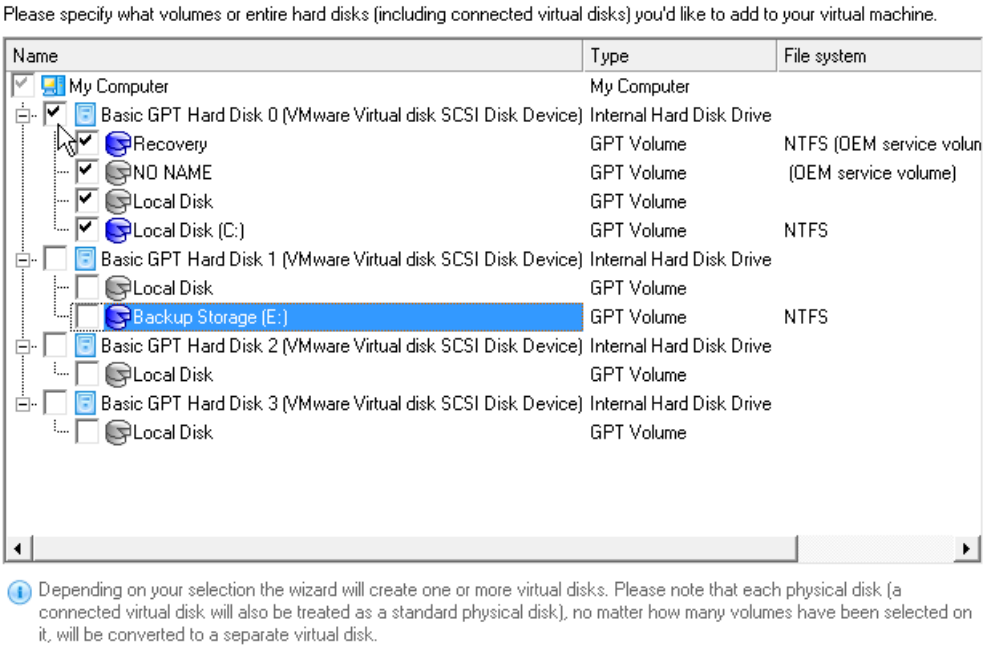
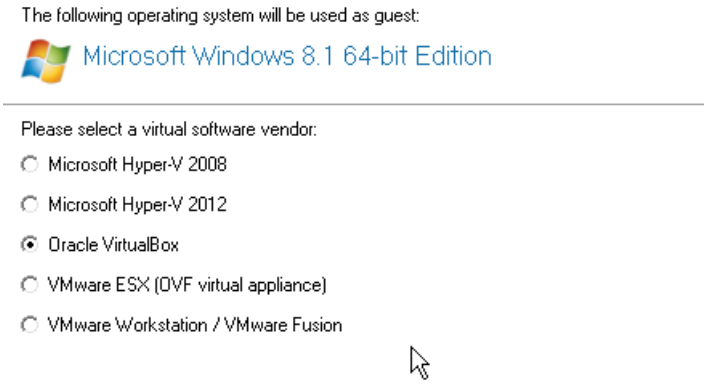


4. Specify the guest OS and a virtualization software vendor. If your system hosts several Windows OSes, our wizard will find them all and automatically patch to run in a virtual environment. However we cannot guarantee smooth startup of all found Windows systems for their configuration parameters may be incompatible with each other. This is why we additionally prompt you to specify what operating system you'd like to use as guest to configure the virtual machine for that particular system.



Not all vendors may be available to choose. If capacity of one of the selected objects exceeds the maximum virtual disk capacity of any vendor, this vendor will be shadowed.

5. Set properties of the future virtual machine:
   - **Virtual machine version**. Please make sure you choose a version which is supported by your virtualization software, otherwise you won't be able to work with the newly created machine.
   - **Virtual machine name**. By default the wizard picks the name of your guest OS, which can be modified however.
   - **CPU number**. If your computer supports multiprocessing, select how many CPUs you'd like to allocate for the virtual machine.

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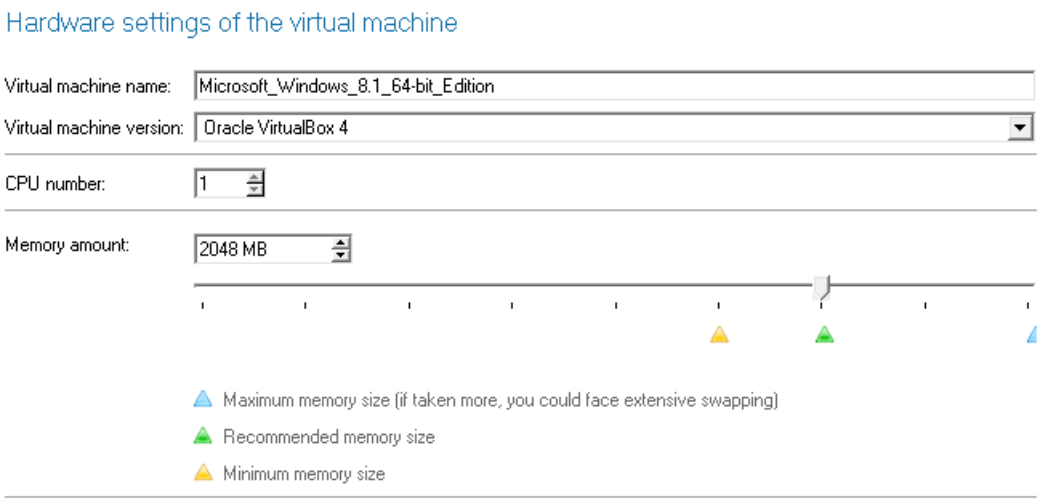
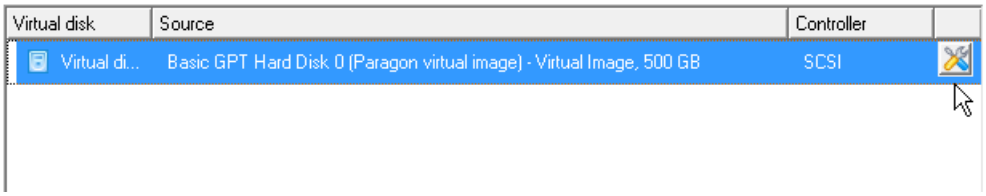
- **Memory amount**. Depending on the guest OS the wizard calculates the recommended size of RAM, which can be modified however.

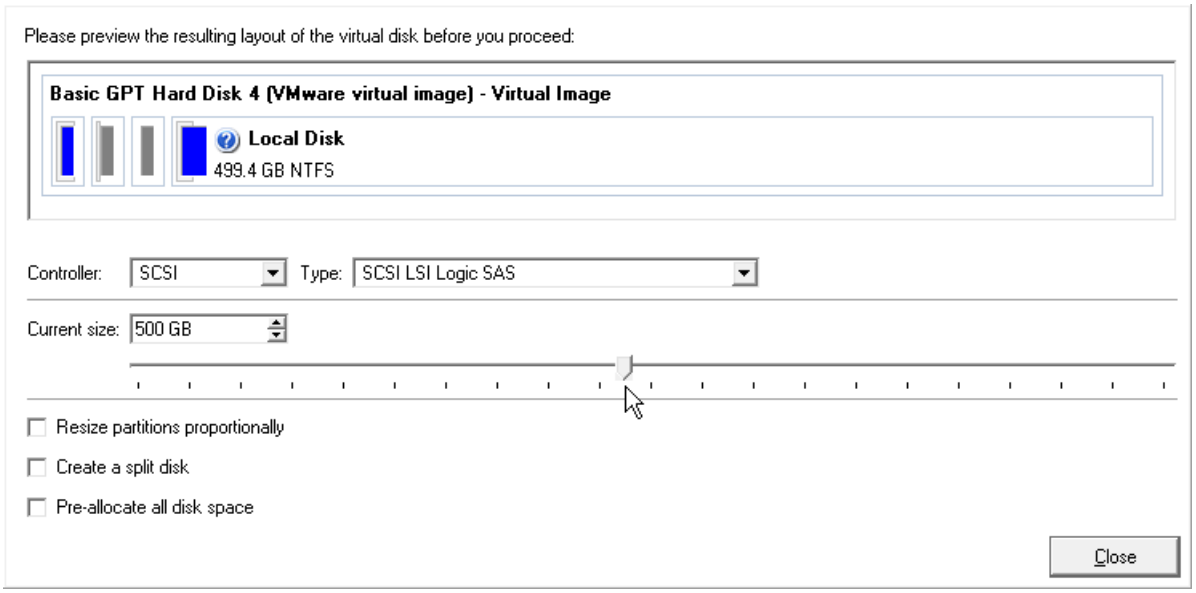


6. Set properties of the resulted virtual disk(s):

- **Virtual disk properties**. By default the wizard sets the most appropriate interface for each disk. Anyway you've got the option to change it to one of the supported by your guest OS. Just click the setup button opposite the required disk to open a configuration dialog.



Here besides the required disk controller and type, you can specify additional options (depends on the selected virtualization vendor):



- **Size of the virtual disk**. By default the wizard offers to create a virtual disk exactly the size of the selected object(s), which you can resize however (available for all);

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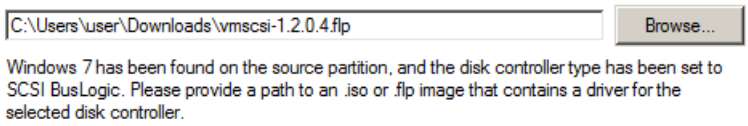
- **Resize partitions proportionally**. If you upsize the resulted virtual disk, you can make the wizard proportionally change the size of partitions keeping their relative order intact (available for all);
- **Create a split disk**. You can choose whether to automatically cut the resulted virtual image to files of 2 GBs or not (available for VMware only);
- **Pre-allocate all disk space**. You can choose whether to pre-allocate all space of the future virtual disk, or do it dynamically (not available for VMware ESX and Oracle VirtualBox).

The maximum limit you can downsize the virtual disk is the capacity of its first partition.

- **Disk controller drivers**. If changing the default disk controller, please be ready to provide drivers for it on the next page.



Our program supports injection of drivers delivered in .iso or .flp images, so you can for instance download and inject drivers for the BusLogic controller from the VMware website.

7. Specify a file name for the virtual machine and its location. By default the wizard scans all your local disks for available free space and picks the most appropriate location taking into account the total capacity of all virtual disks inside the virtual machine.

8. Complete the wizard and then apply the pending changes.

Making Windows Vista and later backup bootable on virtual hardware (P2V Adjust OS)

As you probably know, Windows Vista and later operating systems from Microsoft include a built-in disaster recovery tool, which enables to create backup images of Windows OS in a .vhd (Virtual Hard Disk) format, used now by Microsoft Virtual PC/Server/Hyper-V, and Oracle VirtualBox. Unfortunately you cannot just take this type of backup to run Windows OS in a virtual environment – it won't start up. We can help you out with this naughty problem. Our P2V Adjust OS Wizard can patch Windows OS inside a .vhd backup image according to the specified virtualization vendor to let you start up and work with your Windows on virtual hardware.

To make a Windows .vhd backup image start up in a virtual environment, please do the following:

1. Click the **Copy & Migration** tab on the Ribbon Panel, then select **P2V Adjust**.

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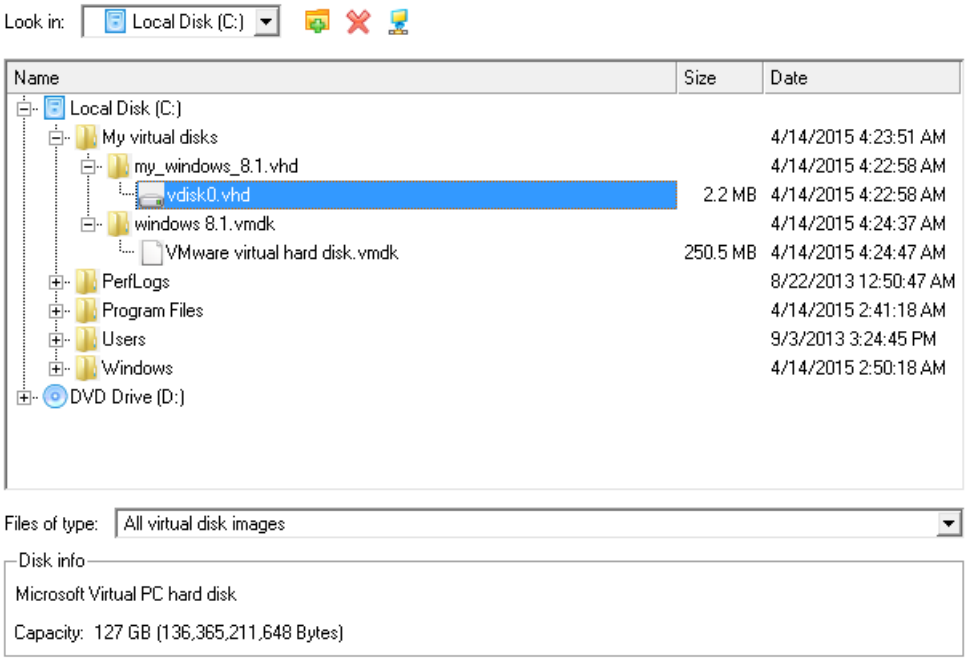
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the Next button.
3. Browse for the required .vhd backup image of your Windows.



4. Our wizard will detect a version of Windows OS inside the image and offer to specify a virtualization software vendor. At the present moment the .vhd format is supported by Microsoft Virtual PC/Server/Hyper-V Oracle VirtualBox, VMware Workstation/VMware Fusion and VMware ESX. We choose the last one.

5. Set properties of the future virtual machine:
   - **Virtual machine version**. Please make sure you choose a version which is supported by your virtualization software, otherwise you won't be able to work with the newly created machine.
   - **Virtual machine name**. By default the wizard picks the name of your guest OS, which can be modified however.
   - **CPU number**. If your computer supports multiprocessing, select how many CPUs you'd like to allocate for the virtual machine.
   - **Memory amount**. Depending on the guest OS the wizard calculates the recommended size of RAM, which can be modified however.

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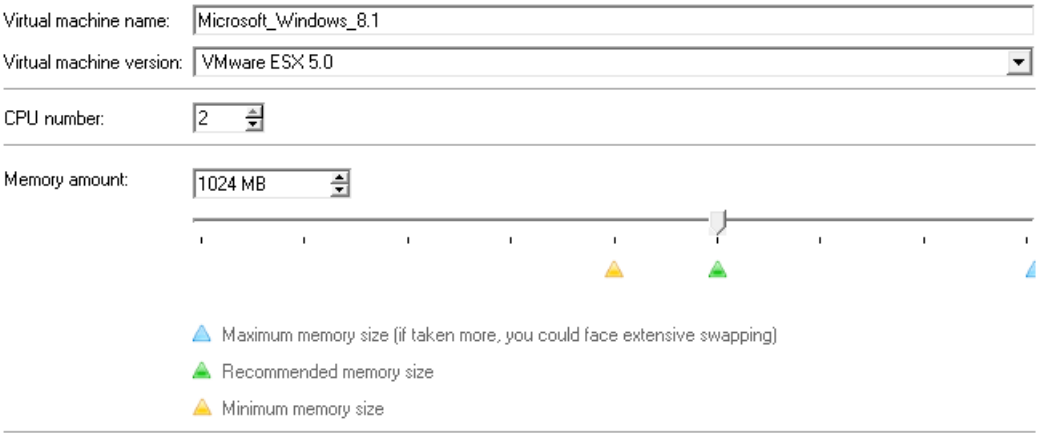
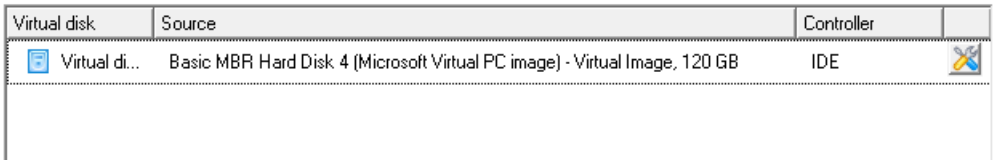


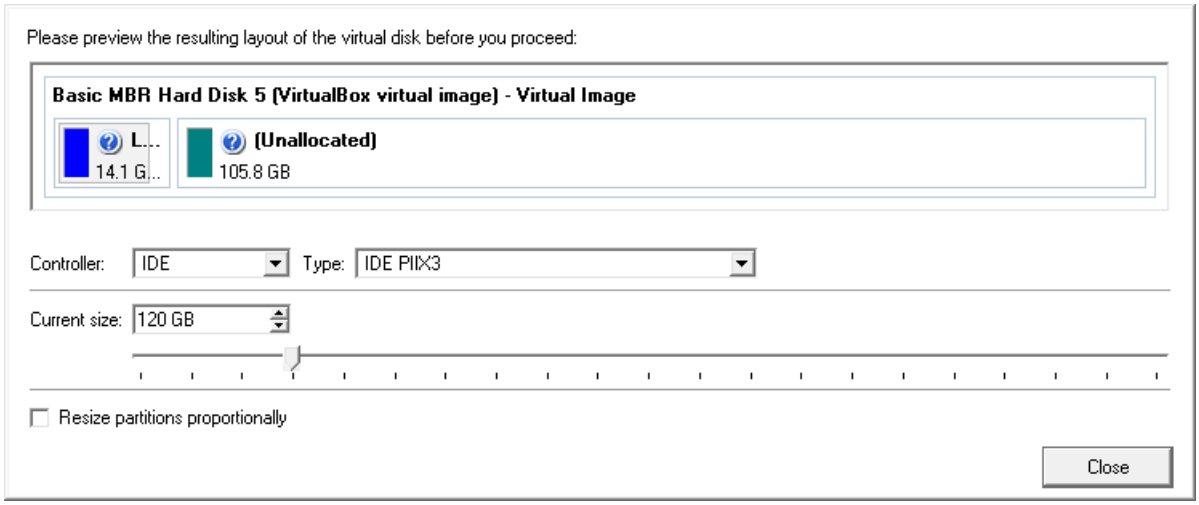
If the selected version does not officially support the guest OS, you will be notified and prompted to select another one.

6. Set properties of the resulted virtual disk(s):

- **Virtual disk properties**. By default the wizard sets the most appropriate interface for each disk. Anyway you've got the option to change it to one of the supported by your guest OS. Just click the setup button opposite the required disk to open a configuration dialog.



Here besides the required disk controller and type, you can specify additional options (depends on the selected virtualization vendor):



- **Size of the virtual disk**. By default the wizard offers to create a virtual disk exactly the size of the selected object(s), which you can resize however (available for all);

- **Resize partitions proportionally**. If you upsize the resulted virtual disk, you can make the wizard proportionally change the size of partitions keeping their relative order intact (available for all);

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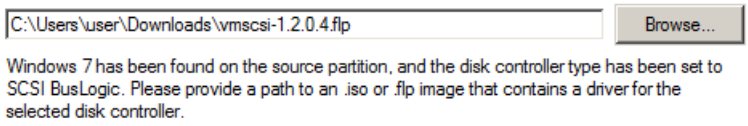
- **Create a split disk**. You can choose whether to automatically cut the resulted virtual image to files of 2 GBs or not (available for VMware only);
- **Pre-allocate all disk space**. You can choose whether to pre-allocate all space of the future virtual disk, or do it dynamically (not available for VMware ESX and Oracle VirtualBox).

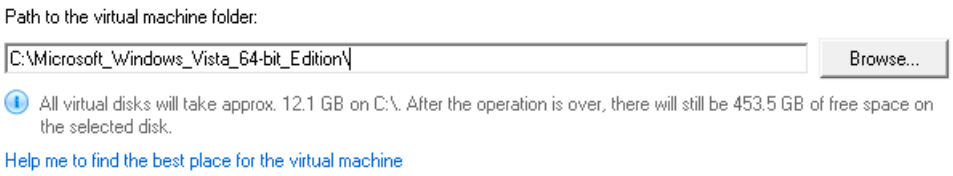
The maximum limit you can downsize the virtual disk is the capacity of its first partition.

- **Disk controller drivers**. If changing the default disk controller, please be ready to provide drivers for it on the next page.



Our program supports injection of drivers delivered in .iso or .flp images, so you can for instance download and inject drivers for the BusLogic controller from the VMware website.

7. Specify a file name for the virtual machine and its location. By default the wizard scans all your local disks for available free space and picks the most appropriate location taking into account the total capacity of all virtual disks inside the virtual machine.



8. Complete the wizard and then apply the pending changes.

Migrating a Windows 7 vhd

Let's assume you need to make your Windows 7 contained in a .vhd file start up on another computer. You've copied the virtual disk, added info on it to the BCD boot menu, then tried to start up the OS, but to no avail - your Windows goes BSOD with the 0x000007B error code. We can help you out with this naughty problem.

To make a .vhd image of Windows 7 start up on different hardware, please do the following:

1. Start up the computer from the WinPE media.
2. Complete the P2P Adjust OS Wizard.

Hard Disk Utilization

To irreversibly destroy all on-disk information without any possibility to recover and that way providing the maximum level of security, please do the following:

1. Click the **Partitioning** tab on the Ribbon Panel, then select **Wipe Disk or Partition**.

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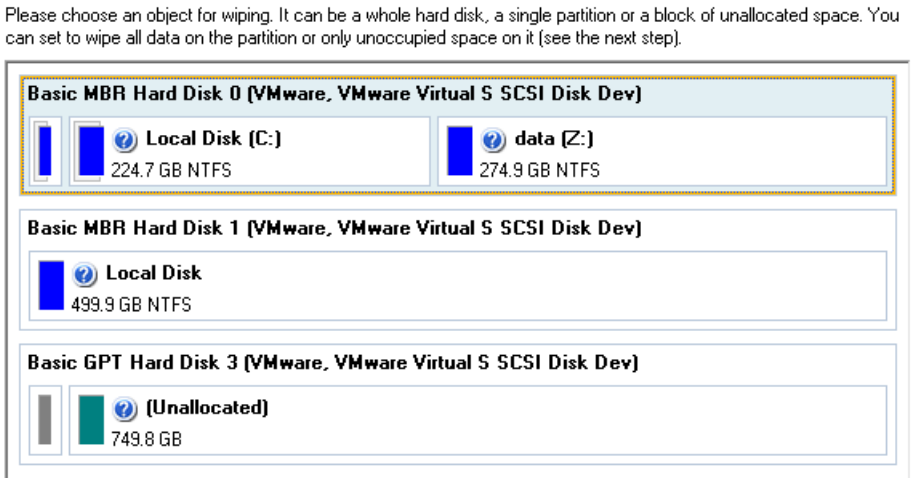
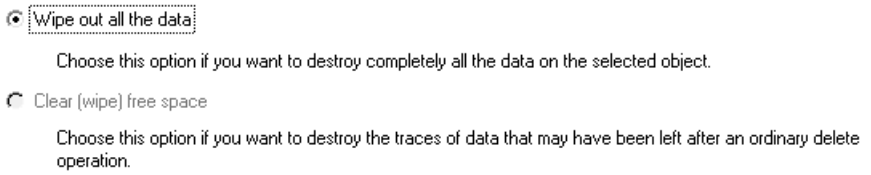
There are other ways to start up this function, please consult the Interface Overview chapter to know more on the subject.

2. On the Wizard's Welcome page, click the Next button.

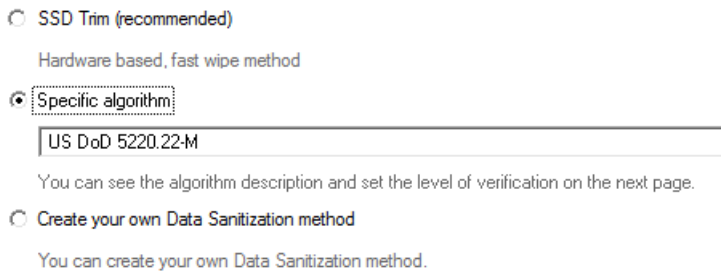
3. Select a hard disk, the data of which you want to wipe out.



4. On the Wipe Mode page, select the wipe out all the data to irreversible destroy all on-disk information.



5. On the Wipe Method page select a specific data erasure algorithm or choose to create a customized one (in our case we prefer to use a certified military standard).



The list of supported military and government standards may vary for your product.

6. The next page of the wizard enables to get detailed information on the selected algorithm, choose whether to carry out residual data verification or not specifying the percentage of sectors to check and estimate the time required to accomplish the operation.

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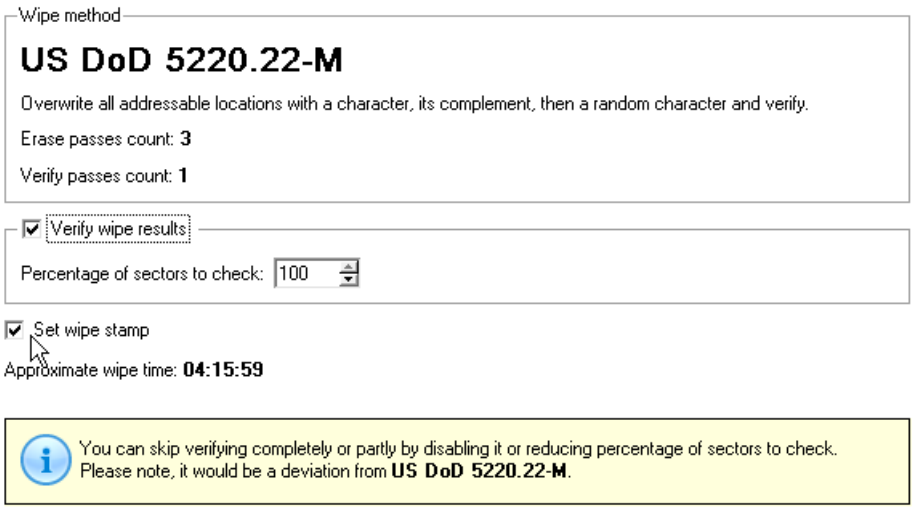
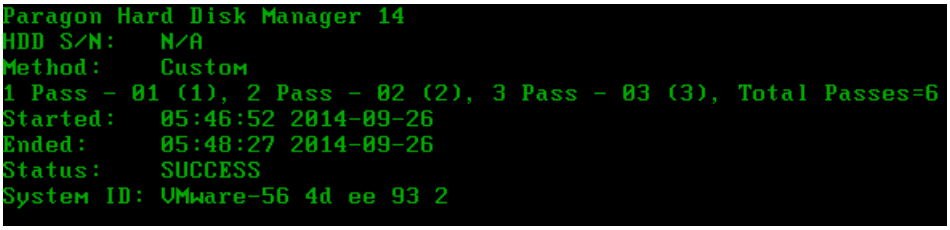
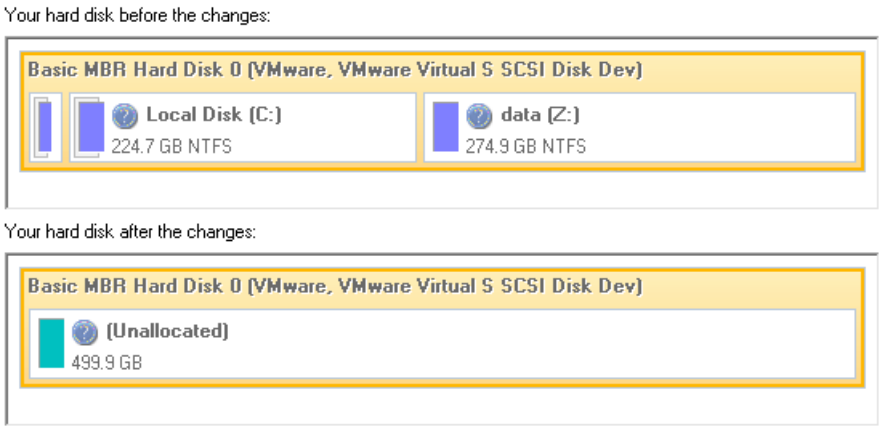


By marking the **Set wipe stamp** checkbox you make the wizard add to the MBR of the wiped storage device information on the used wipe program, algorithm, device serial number, wipe status, system ID (obtained through WMI), etc. Thus when attempting to boot from this storage, you'll be notified how and when this storage has been wiped. Please note this option is only available for wiping of entire disks.



7. Review all parameters of the operation and modify them if necessary.



8. Complete the wizard and then apply the pending changes.

Extra Scenarios for WinPE

Please use Recovery Media Builder to prepare Paragon's recovery environments on CD/DVD, flash, or in an ISO-image.

Adding specific drivers

The WinPE based recovery environment offers excellent hardware support. Anyway you've got the option to add drivers for specific hardware with a handy dialog.

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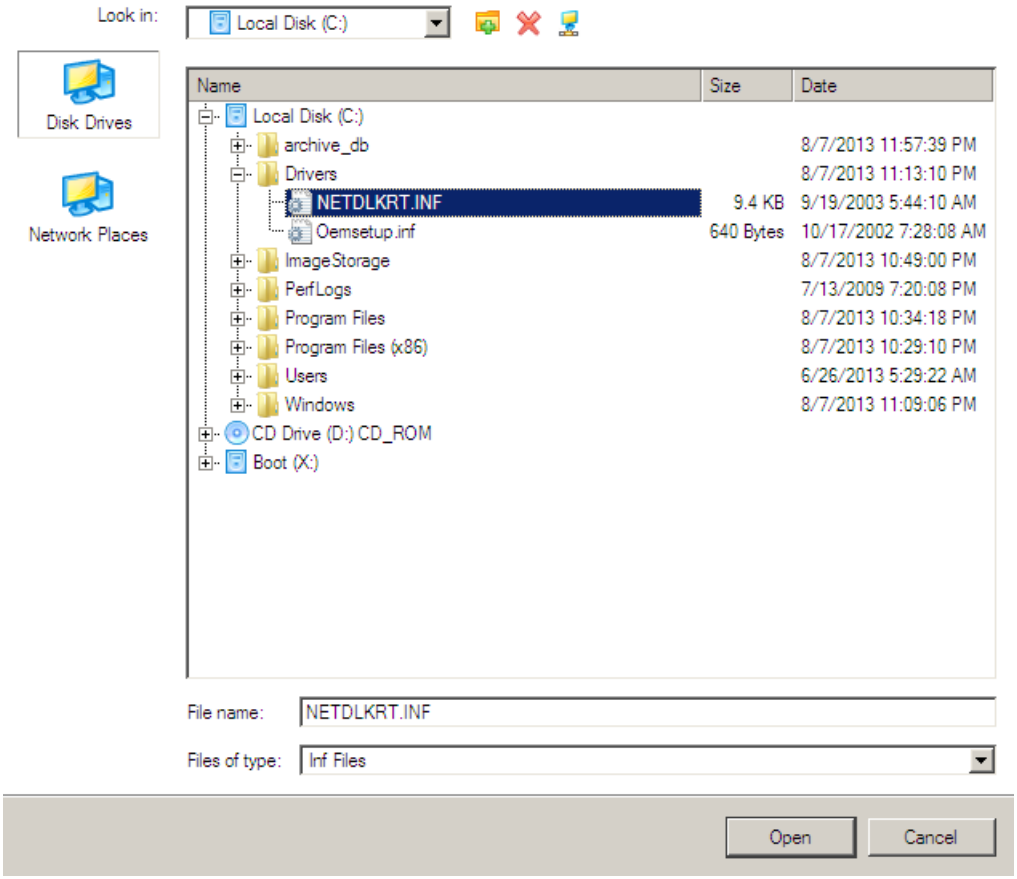
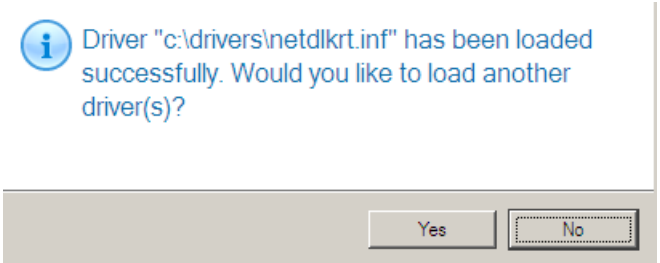
To add drivers for specific hardware, please do the following:

1. Click **Load Drivers**.
2. In the opened dialog browse for an .INF file of the required driver package located on a floppy disk, local disk, CD/DVD or a network share. Then click the **Open** button to initiate the operation



To know how to map a network share, please consult the Configuring network scenario.

3. You will be notified on the successful accomplishment of the operation. Click **Yes** to load another driver or **No** to close the dialog.



The WinPE recovery environment can either be 32- or 64-bit, so are to be drivers for injection.

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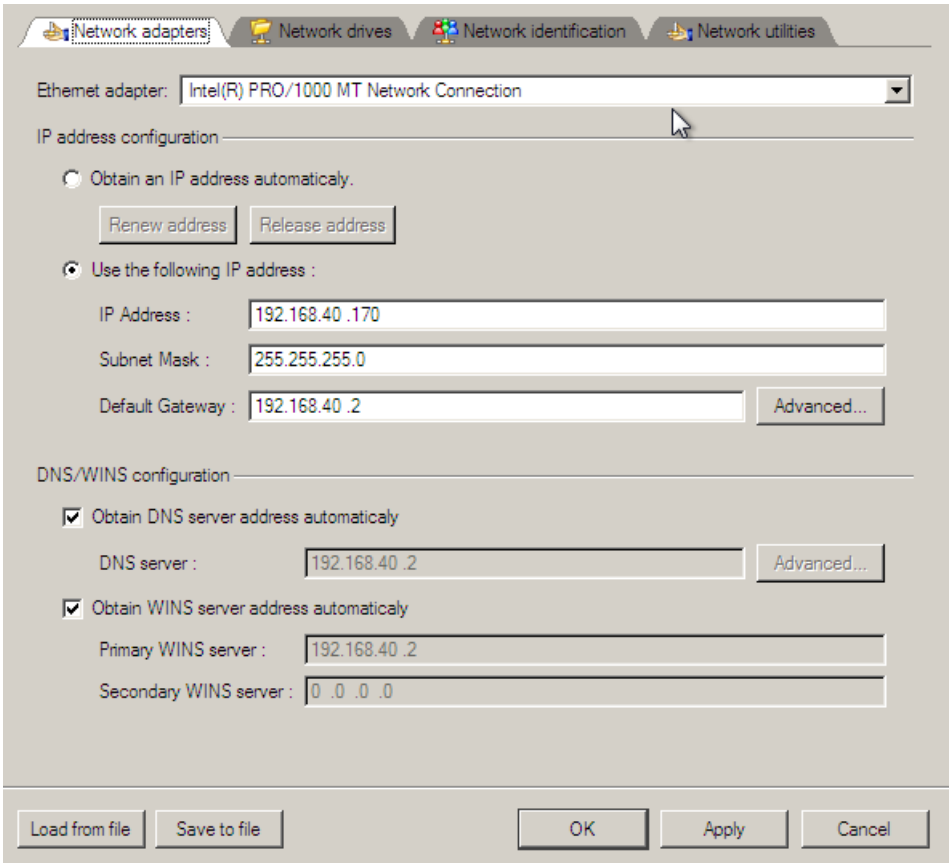
Configuring network

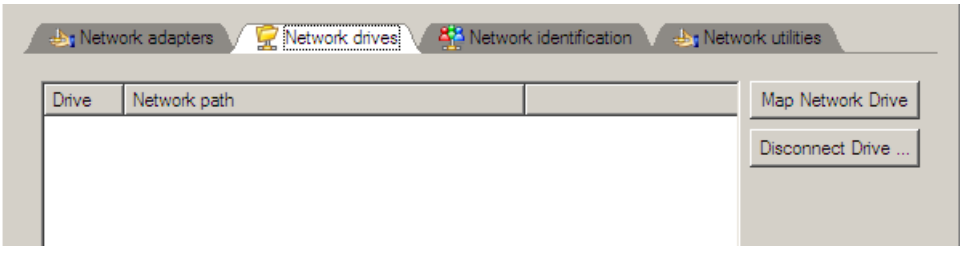
If your local network has a DHCP server, a network connection will be automatically configured once the WinPE recovery environment has been started up. Otherwise you will need to do it manually with a handy dialog by providing an IP address, a network mask, default gateway, etc. Besides with its help you can easily map network shares.

To manually set up a network connection and map a network share, please do the following:

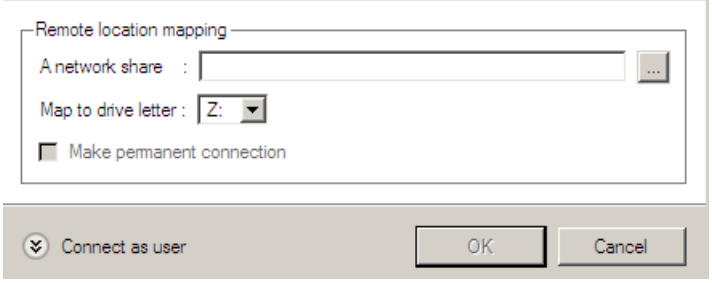
1. Click **Configure Network**.
2. In the opened dialog provide an IP address, a network mask, default gateway, etc. for your network device.



3. Click the **Network drivers** tab to map a network share.



4. Click **Map Network Drive** and provide all the necessary information to map a network share in the opened dialog:



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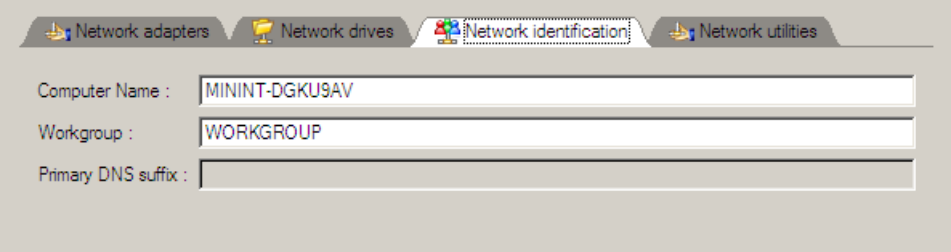
- Click the standard browse button [...] to browse for the required network share or manually enter a path to it;
- Define a letter from the pull-down list of available drive letters;
- Click the **Connect as user** button at the foot of the dialog page to specify a user name and password to access the selected network share if necessary.

By clicking **Disconnect Drive…** you can delete an existing network share if necessary.

5. Click the **Network identification** tab to change a network name of your computer (generated automatically) and a workgroup name.

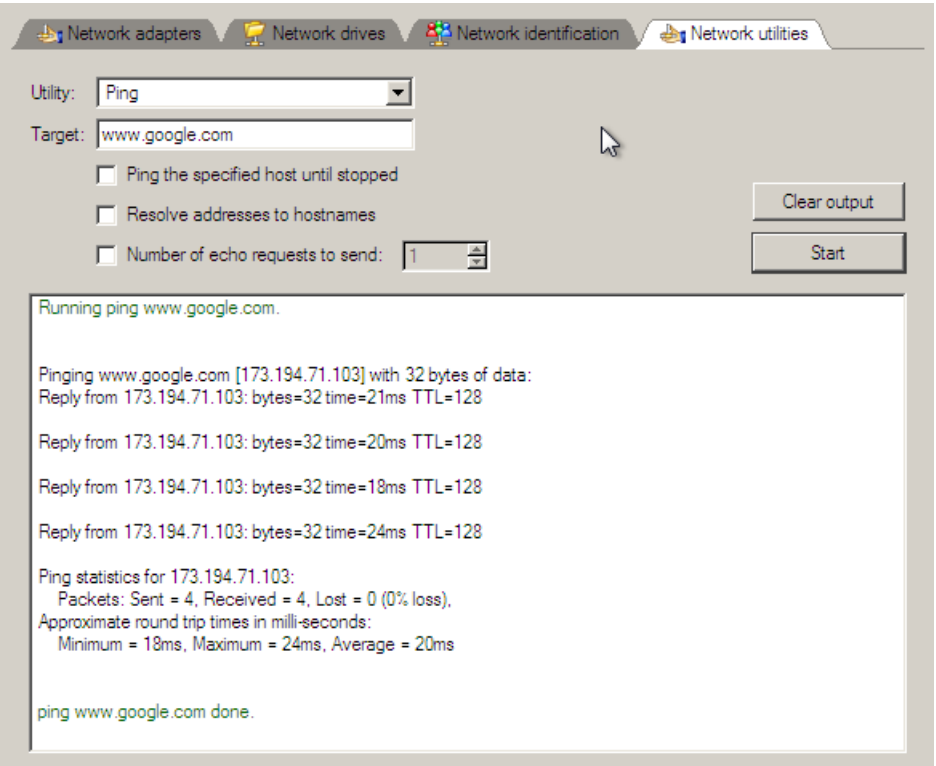


6. By default, the wizard saves all network settings in the netconf.ini file located on the WinPE RAM drive, thus it will only be available until you restart the computer. However, you can just once configure your network device and then save this file to some other destination, for instance a local drive, and this way avoid constant re-configuration, just by providing a path to it. So Click **Save to file** to save the netconfig.ini file to the required destination.

Network troubleshooter

Network Configurator includes a traceroute/ping utility that enables to get detailed information on particular routes and measure transit delays of packets across an Internet Protocol (IP) network. So with its help you can easily track down problematic nodes.

1. If you need to ping some network host, please select **Ping**, then type in the required IP address or its name. Click **Start** when ready.



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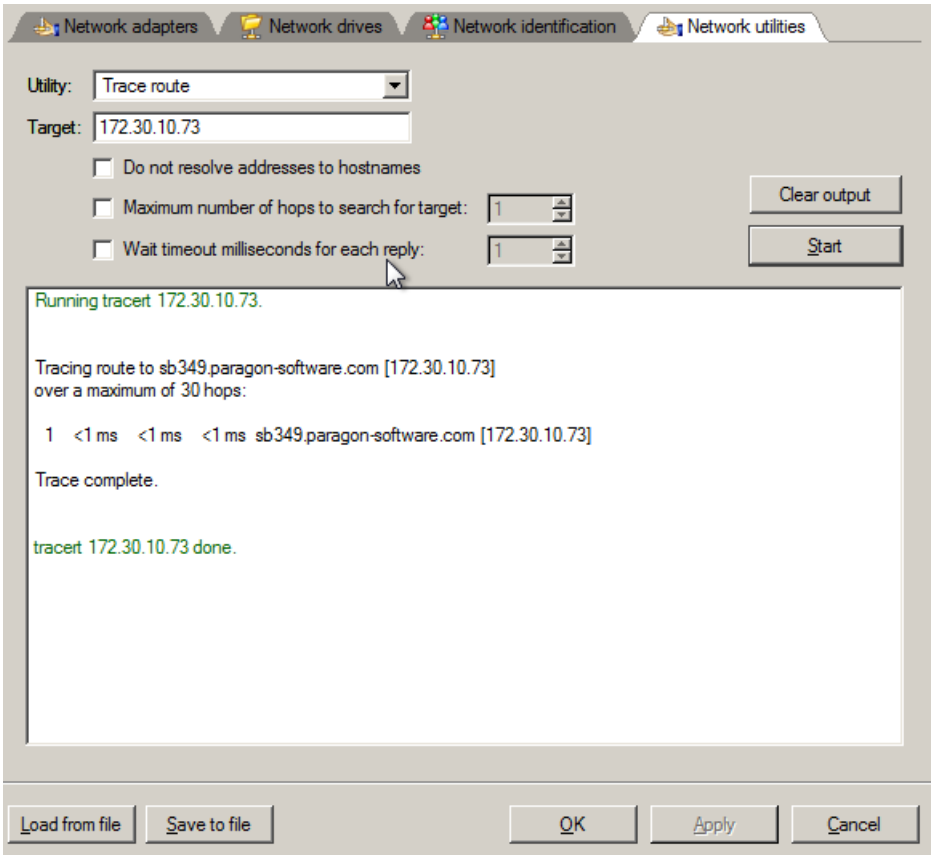
- **Ping the specified host until stopped**. Mark the option to ping the chosen host for indefinite time;
- **Resolve addresses to hostnames**. Mark the option to display hostnames instead of IP addresses.
- **Number of echo requests to send**. By default the utility sends 4 echo requests, which you can modify however.

2. If you need to trace a route to some network host, please select **Trace route**, then type in the required IP address or its name. Click **Start** when ready.



- **Do not resolve addresses to hostnames**. Mark the option to display IP addresses instead of hostnames.
- **Maximum number of hops to search for target**. By default the utility goes through maximum 30 hops when searching for the target host, which you can modify however.
- **Wait timeout milliseconds for each reply.** By default the utility waits 4 seconds for each echo reply message. If not received within the timeout, an asterisk (*) is displayed.

Saving log files

The program enables to simplify the procedure of sending support requests to the Paragon Support Team. In case of having difficulties with handling the program, you, with the help of this very function, can address the company support engineers and provide them with all the information they need such as the disk layout, performed operations, etc. in order to tackle the encountered problem. Information of that kind is stored in log files.

To prepare a log files package, please do the following:

1. Click **Log Saver**.
2. Provide an e-mail address used for registering the product, then give a detailed description on the encountered problem in the corresponding text fields. Please don’t worry - we respect your privacy, so none of your confidential data will be exposed. This utility only collects the program’s operation logs to help our Support Team find and tackle your problem. Click **Next** to continue.

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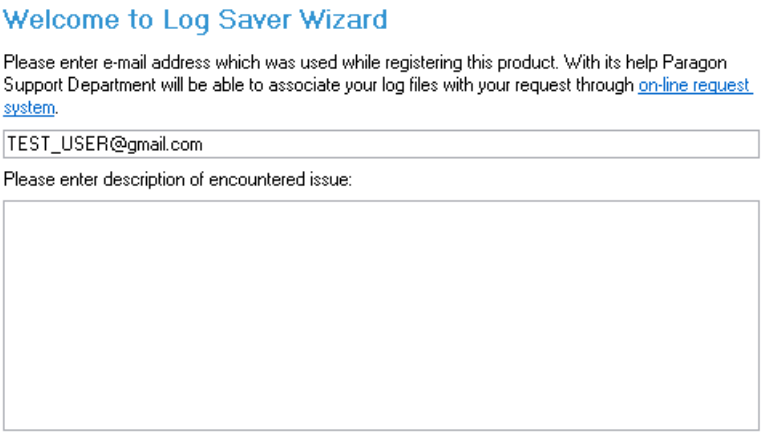
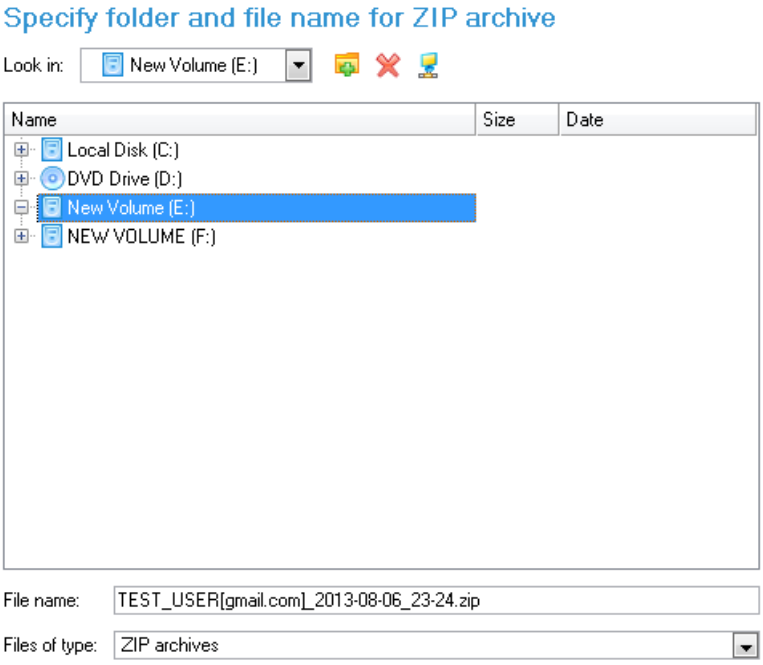


Log files do not contain any confidential information on the operating system settings or the user documents.

3. Browse for the required location of the log files package or manually provide a full path to it. Click **Save** to initiate the operation.



This function is also available under Windows.

Troubleshooter

Here you can find answers to the most frequently asked questions that might arise while using the program.

1. I try to run an operation, but the program claims my partition is in use and suggests restarting the computer.

   There are a number of operations that cannot be performed while your partition is in use (or locked in other words). Please agree to reboot your machine to make the program accomplish the operation in a special boot-up mode.

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2. I run an operation and restart the machine as required, but it just boots back into Windows without accomplishing the operation.

   Please run 'chkdsk /f' for the partition in question.

3. I cannot create a new partition on the disk.

   There can be a number of reasons for that:

   - The program cannot create a new partition on a dynamic disk.
   - The program allows creating new partitions only within blocks of un-partitioned space. It cannot convert a free space on an existing partition to a new partition.

4. I cannot copy a partition.

   There can be a number of reasons for that:

   - The source or target disk you select is a dynamic disk;

   - 4 primary partitions (or three primary partitions and an extended one) already exist on the target disk.

5. I need to copy a partition. But when selecting a place where to make a copy, I always get a crossed circle sign no matter which partition is selected.

   The program enables to copy a partition only to a block of un-partitioned space. If you don’t have a block of free space on your hard disk, please delete or reduce an existing partition to accomplish the operation.

6. I cannot do anything with my USB flash drive. I get a crossed circle sign when trying to select any area on it.

   Some USB flash drives don't have the MBR (Master Boot Record), that’s the cause of your problem. To fix the issue please use the Update MBR function of our program or 'fixmbr' of the Windows installation disc to write a standard code to your flash drive.

7. When trying to back up my system the program asks to restart the computer.

   Most likely the Hot Processing mode is disabled. Please make it active in the program settings.

8. When backing up a partition with the VSS (Volume Shadow Copy Service) mode, the program throws "VSS could not be started for processed volume".

   Most likely you try to back up a FAT32 partition, which is not supported by VSS. Please use the Paragon Hot Processing mode instead.

9. I cannot back up my hard disk to an external hard drive. Once started, the operation is aborted with the following error: Hard Disk management, Error Code 0x1100a. What is wrong here?

   The problem is that the Microsoft VSS service is set as the default Hot Processing mode in the program. But this service has not been started in your WindowsXP/Windows2003/Vista. Please start this service (right click on My Computer > Manage > Services > find Microsoft Volume Shadow Copy Service and make it active. Set also to start it automatically).

10. When running a backup operation with the Paragon Hot Processing mode enabled, I get an error: error code 0x1200e "Internal error during Hot Backup"

    Most likely your hard disk contains bad blocks. Please fix the issue with your HDD manufacturer's tool.

    You can find a name of the tool you need here: http://kb.paragon-software.com

11. When running a backup operation with the Microsoft VSS mode enabled, I get the following error: error code 0x12016 "VSS: can't read volume data”

    Most likely your hard disk contains bad blocks. Please fix the issue with your HDD manufacturer's tool.

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You can find a name of the tool you need here: http://kb.paragon-software.com

12. When trying to back up to a network share, I get the following error: "i/o error" or "can't open/create file"

    Please check whether you've got a permission to write to the selected destination or not.

13. When trying to restore a backup archive, I get the following error: "Can't restore to current selection" or "Archive does not fit"

    Most likely you're trying to restore a backup of the whole hard disk to a partition or vice versa.

14. I set up a timetable for a task, but it fails to execute.

    There can be a number of reasons for that:

    - Windows Task Scheduler does not work properly. Check whether it is so or not by scheduling a simple task (call Notepad through scheduling);

    - You don't have permission to write to the selected backup destination.

Glossary

Active Partition is a partition from which an x86-based computer starts up. The active partition must be a primary partition on a basic disk. If you use Windows exclusively, the active partition can be the same as the system volume.

In the DOS partitioning scheme, only primary partitions can be active due to limitations of the standard bootstrap.

The term **backup** originates from the time when the best way to protect valuable information was to store it in form of archives on external media. It's become now a general notion to mean making duplications of data for protection purposes.

Bootable Archive is created by adding a special bootable section when backing up the data to CD/DVDs. Thus you will be able to restore the data from these archives without having to run the program, but by simply booting from these CD/DVDs.

Cluster is the smallest amount of disk space that can be allocated to hold a file. All file systems used by Windows organize hard disks based on clusters, which consist of one or more contiguous sectors. The smaller the cluster size, the more efficiently a disk stores information. If no cluster size is specified during formatting, Windows picks defaults based on the size of the volume. These defaults are selected to reduce the amount of space that is lost and the amount of fragmentation on the volume. A cluster is also called an allocation unit.

Extended Partition is a partition type you create only on a basic MBR (Master Boot Record) disk. Extended partition is used if you want to create more than four volumes on a disk, since it may contain multiple logical drives.

File System Metadata. The servicing structures of a file system, which contain information about allocating files and directories, security information etc, are named the file system metadata. It is invisible for users and regular applications because its accidental modification usually makes a partition unusable.

Hard Disk Geometry. Traditionally, the usable space of a hard disk is logically divided into cylinders, cylinders are divided into tracks (or heads), and tracks are divided into sectors.

The triad of values {[Sectors-per-Track], [Tracks-per-Cylinder], [Amount-of-Cylinders]} is usually named the Hard Disk Geometry or C/H/S geometry.

Tracks and cylinders are enumerated from "0", while sectors are enumerated from "1". These disk parameters play an essential role in the DOS Partitioning scheme.

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Modern hardware uses an advanced scheme for the linear addressing of sectors, which assumes that all on-disk sectors are continuously enumerated from “0”. To allow backward compatibility with older standards, modern hard disks can additionally emulate the C/H/S geometry.

Hidden Partition. The concept of a "hidden" partition was introduced in the IBM OS/2 Boot Manager. By default, an operating system does not mount a hidden partition, thus preventing access to its contents.

A method of hiding a partition consists in changing the partition ID value saved in the Partition Table. This is achieved by XOR-ing the partition ID with a 0x10 hexadecimal value.

Master File Table (MFT) is a relational database that consists of rows of file records and columns of file attributes. It contains at least one entry for every file on an NTFS volume, including the MFT itself. MFT is similar to a FAT table in a FAT file system.

MBR & 1st track of the hard disk is the 0th sector of the disk. MBR (Master Boot Record) contains important information about the disk layout:

- The used partitioning scheme;

- The starting records of the Partition Table;

- The standard bootstrap code (or the initial code of boot managers, disk overlay software or boot viruses).

Generally, the 0th sector is used for similar purposes in all existing partitioning schemes.

The MBR capacity is not sufficient to contain sophisticated boot programs. That’s why the on-boot software is allowed to use the entire 0th track of the disk. For example, boot managing utilities such as LILO, GRUB and Paragon Boot Manager are located in the 0th track.

Partition ID (or File system ID) is a file system identifier that is placed in the partition. It is used to quickly detect partitions of supported types. A number of operating systems completely rely on it to distinguish supported partitions.

Partition ID is saved in appropriate entries of the Partition Table and takes only 1 byte of space.

Partition Label (or Volume Label) is a small textual field (up to 11 characters) that is located in the partition's boot sector. This value is used for notification purposes only. It is detectable by any partitioning tool including the DOS FDISK utility.

Modern operating systems save it within a file system, e.g. as a special hidden file. Thus it is able to contain a relatively large amount of text in multiple languages.

Partitioning Scheme is a set of rules, constraints and format of the on-disk structures to keep information on partitions located on a hard disk.

There are known several partitioning schemes. The most popular of them is the so-called DOS partitioning scheme. It was introduced by IBM and Microsoft to use multiple partitions in the disk subsystems on IBM PC compatible computers.

Another popular partitioning scheme is the so-called Logical Disks Model (LDM) that originates from the UNIX mainframe systems. Veritas Executive accommodates a simplified version of LDM to the Windows 2000 operating system.

Windows 2000 and XP support two quite different partitioning schemes: the old DOS partitioning scheme and the new Dynamic Disk Management (DDM). The problem is that earlier versions of Windows do not support DDM. In addition, most hard disk utilities do not support it as well.

Recovery Media is a CD/DVD disc, a USB flash card or even a floppy disk from which you can boot for maintenance or recovery purposes.

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Root Directory is the top-level directory of a formatted logical drive to include other files and directories. In modern file systems (Ext2/Ext3, NTFS and even FAT32) it does not differ from other directories. This is not the case for old FAT12 and FAT16 file systems.

Serial Number. In the DOS partitioning scheme, every hard disk and every partition has a 32-bit serial number represented by an 8-figure hexadecimal value. It is stored in the MBR and its value is assigned when the MBR sector is initialized by Microsoft standard disk managing tools, such as Windows Disk Administrator and the FDISK utility.

In fact, a hard disk's serial number is not important for most operating systems and software. It is known that Windows NT, 2000 and XP store its value in the database of assigned drive letters.

A partition's serial number is stored in its boot sector (in FAT16, FAT32 and NFTS file systems). Its value is assigned when the partition is formatted. It does not play an important role for most operating systems and software as well.

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